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The Journal of the Telephone Industry

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FLASHES *and Plugs*

TELLS ALL—SHOWS ALL. FRED S. FLORANCE, general manager of the Highland Telephone Co., Monroe, N. Y., recently showed members of the Monroe Chamber of Commerce the intricacies of the modern telephone system as built around the dial system. With the use of portable equipment Mr. Florance demonstrated what takes place from the time a customer lifts a telephone and starts to dial until the call is completed.

The Highland company was formed in Highland Mills in 1902 and in 1935 became the second company in this country to install a dial toll switchboard, it is claimed.

• • •

SHAME! Three-year-old Walter Montgomery, Indianapolis, Ind., poked a piece of wire into an electric outlet while standing on a metal register in his home and died while his mother tried frantically to gain release of a busy eight-party telephone line for a call for help.

"My baby is dying," she screamed into the telephone.

"We'll be through in a minute," was the haughty reply Mrs. Elvis Montgomery said she heard.

The father then raced the boy to a doctor in his automobile, but he was dead upon arrival.

• • •

1,000 SLUGS A DAY! Maybe the steel strike had something to do with it. Or probably it's just a token of prosperity. Or possibly the human race is getting better. Anyway, the number of slug "cheaters" dropped in telephone coin boxes has trickled down to "a mere nothing" in Chicago. To the "not complaining" Illinois Bell company, "a mere nothing," comparatively, is 1,000 slugs a day. Its own idea of the reason for the decline is laws prohibiting manufacture of the slugs. If this gives anyone the idea of going into illegal slug manufacturing, the telephone company has made it known that automatic detectors which slam the slugs back at the slugger will be installed on pay telephones.

• • •

WAKE-UP, SLEEPYHEAD! Elizabeth Kelly, who is blind, and Mrs. Mary Cushing, whose vision is only one-fourth normal, each operate "wake-up" services in Omaha, Neb. Miss Kelly calls 54 patrons daily beginning at 4:30 a.m. She writes her lists of names and numbers with a stylus, in Braille, uses a clock without a crystal to "see" the time. Mrs. Cushing, who operates "Mary's Wake-Up Service," calls 30 people regularly.

• • •

GASSED OUT! Gas killed 4,076 people last year; 29 inhaled it, 47 put a lighted match to it, 4,000 stepped on it.

• • •

TELEPHONE HALTS ROBBERY. Ringing of a party line telephone in the state bank at Niotaze, Kan., was believed to have frightened away nighttime burglars who cut into the vault with a torch. A Niotaze resident, next door to the bank, saw three persons in the bank and ran to the telephone to call the sheriff.

The sheriff's telephone is on the same line as the bank and the ringing caused the robbers to vamoose.

"TROUBLE OUT ON THE LINE"

calls for men and equipment—*fast!*

THAT'S when Highway Maintenance Bodies are most appreciated because there's a place for every tool, every needed material, and comfortable riding quarters for an adequate crew. No matter whether the trouble is on a main road or down a remote forest trail, Highway all-metal bodies are built strong to serve dependably for many years.

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Other Highway equipment that has become famous throughout the industry includes Highway Earth Boring Machines, Pole Trailers, Cable Reel Trailers, Winches, and Power Take-offs. Write to us about your needs.

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USITA PLANS FIRST POSTWAR EXECUTIVES' CONFERENCE

By CLYDE S. BAILEY
USITA Executive Vice President

Raymond Moley to speak. Important issues confronting managements of telephone companies will be discussed by outstanding industry leaders in two-day meeting at Edgewater Beach Hotel, Chicago, on April 16 and 17.

WITH the exception of 1945 a spring conference of the executives of Independent telephone companies has been held under the auspices of the United States Independent Telephone Association for many years. We are happy that the war restrictions which prevented a conference last year have disappeared, and that telephone executives can again gather to discuss problems confronting management.

Our 1946 executives' conference at the Edgewater Beach Hotel in Chicago on April 16 and 17 will be an unusually important one because it will be the first time since our enemies were vanquished that managements of Independent telephone companies have been together at a national meeting to discuss the significant issues confronting us in the postwar period.

The meeting will not be a convention. It will be, what its name suggests, a conference of the executives of Independent telephone companies. At our national convention next October we shall be glad to have all branches of the telephone business represented, from the president on down to the office boy. But the executives' conference in April is one of management. It is a meeting of and for the policy makers.

A carefully budgeted schedule has been prepared for the two-day meeting under which a limited number of subjects will be considered. Each subject will be assigned a certain amount of time which will be indicated on the printed program and speakers will be advised in advance how much time they will be expected to take. Our president, Col. William C. Henry, as the presiding officer, will see to it that the program as arranged is carefully carried out.

We feel fortunate that we have been able to persuade those who will address the conference to give us the benefit of their time and knowledge in discussing the postwar subjects that are pressing upon us for attention.

Raymond Moley has indicated his willingness to address us upon the general economic problems facing the nation as a whole. The title of this distinguished citizen's address will be "The Frozen Frontiers of Business." Mr. Moley is well known as a journalist, author, speaker, professor of public law at Columbia University, an associate of *Newsweek*, as well as a former assistant secretary of state. What he has to say will be at once challenging and illuminating and will assist us in beginning our conference with a broad perspective.

Other speakers to appear on the program are recognized leaders in the Independent telephone industry best qualified to handle the particular subjects assigned to them.

Perhaps we may not all find ourselves in agreement on what constitutes the major issues of the day, but certainly all must admit that the threat to the Independent telephone industry inherent in pending minimum wage legislation presents a challenge to the best minds we have. This threat will continue to a very substantial degree even if we should prove successful in persuading Congress that our present 500-station exchange exemption should be increased to include all exchanges with less than 1,000 stations.

This matter is going to be aired at the executives' conference by people

who have been on the firing line in the legislative battle and by practical operating people whose job it will be to find ways to meet the increased operating costs if Congress passes a new minimum wage bill. There is to be a panel discussion of this topic at the executives' conference, coupled with a discussion of other employment relations problems of primary concern to company management.

Another topic telephone executives will certainly wish to discuss is telephone service. The kind of service the public was willing to put up with when battles were raging and first call on critical materials had to be given to munitions plants, is not the kind the public demands today. Recent service investigations started by several regulatory commissions reflect this demand. Every telephone company wants to improve its service as fast as possible. At the executives' conference there will be a lot of comparing of notes on measures that can be taken to elevate service standards.

Everybody these days is talking about radio as a means of supplementing wire telephone facilities. At the request of the telephone industry the Federal Communications Commission last year allocated certain channels for highway mobile radio-telephone service and other forms of telephone service in which radio can play a part. The plant and commercial committees of the national association have just completed a broad study into the ramifications in the new technology. More and more telephone companies are looking into the possibilities of using radio in their telephone operations. This topic is another one to be explored in its broader outlines at our executives' conference. The discussion is to be non-technical and designed to acquaint telephone managements with the whys and wherefores. It will be led by a panel of three men chosen for their outstanding qualifications in this new field.

A solution to the rural telephone problem is something all of us have been seeking. Search for a solution has been going on at a more rapid rate as a result of various legislative proposals in recent times. Now that the war is over we may expect the search to proceed at an even faster pace. The progress being made in getting a telephone to the farmer will receive its share of attention at the executives' conference.

Important get-togethers have been held during the past year by our very capable Toll Compensation & Settlements Committee with representatives of the American Telephone & Telegraph Co. concerning our toll relationships with the Bell System companies. Our committee will have something of much interest on this subject to talk about.

The present tax situation as related to the telephone industry is something upon which tax conscious telephone executives want as much light as possible. They are going to get it at the April 16 and 17 executives' conference.

More than a year ago the national association was foresighted enough to recognize that various commercial, plant and inter-company problems would arise early in the postwar period when conversions from manual to dial operation were permitted under relaxed priority restrictions. It was recognized that vexatious questions would be presented when control office contracts come to be written. The Dial Interexchange Committee then appointed has been making intensive studies of these problems and has had

PROGRAM

EXECUTIVES' CONFERENCE ON POSTWAR PROBLEMS

Edgewater Beach Hotel
Chicago, Ill.

Tuesday, April 16

9:00 A.M. Registration in Hall adjacent to East Lounge.

10:00 A.M. Call to Order.

A Peep Over the Horizon—William C. Henry, president.

Your Association Headquarters in Action — Clyde S. Bailey, executive vice president.

A Message from the Secretary's Office—Floyd D. Ridings, secretary.

The Frozen Frontiers of Business—Raymond Moley, professor of public law, Columbia University; associate, *Newsweek* magazine; journalist, author and speaker.

2:00 P.M. The Work of the Toll Compensation & Settlements Committee—E. M. Blakeslee, chairman.

The Minimum Wage Situation and Other Employment Relations Problems

Panel Discussion

Chairman—J. H. Agee, chairman, Employment Relations Committee.

Member—J. C. Crowley, chairman, Subcommittee on Wage-Hour Legislation.

Member—L. F. Shepherd, former member NWLB National Telephone Commission.

Questions from the floor and answers by the panel.

Wednesday, April 17

10:00 A.M. Developments in Connection with Continuing Property Record Requirements—V. E. Chaney, chairman, Continuing Property Record Committee.

Current Accounting Problems—R. D. Heusel, chairman, Accounting Committee.

An Advertising Program for the Coming Year—L. F. Roberts, chairman, Advertising Committee.

The Present Tax Situation as Related to the Telephone Industry—H. V. Bozell, chairman, Tax Committee.

The Dial Interexchange Committee and its Work—F. E. Norris, chairman.

Progress Being Made in Solving the Rural Telephone Problem R. A. Lumpkin, chairman, Rural Telephone Service Committee.

2:00 P.M. How Independent Telephone Companies Can Use Radio to Supplement Wire Telephone Facilities

Panel Discussion

Chairman—C. E. Jones, chairman, Plant Committee.

Member—H. W. Pike, chairman, Commercial Committee.

Member—B. C. Burden, consulting engineer, former engineer of USITA.

Questions from the floor and answers by the panel.

conferences upon them with representatives of the American Telephone & Telegraph Co. This committee is going to have an important report to make at our executives' conference.

An advertising program for the coming year is a subject that will be reported upon by our energetic Advertising Committee.

Developments in connection with the continuing property record requirements of existing accounting systems will be discussed by our Continuing Property Record Committee, which will report upon the results of conferences with representatives of the regulatory bodies including the Federal Communications Commission. Because of various considerations the FCC has granted extensions from year to year of the date for setting up accounts on an original cost basis and completing a continuing property record plan. The last extension runs only until June 30, 1946. What then?

Other current accounting problems, of immediate interest to company managements, will be dealt with by our Accounting Committee. What about the impact of the recent decision of the U. S. Supreme Court in the New York telephone accounting case? What are the regulatory commissions likely to do if your plant accounts have not been set up in accordance with original cost as that term is currently being defined? Our Accounting Committee is prepared to discuss these questions at the executives' conference.

Everybody of course will be especially interested in what is going to be said by the chief executive of the association, President Henry, whose address will open the conference. Although the title of his remarks is set down as "A Peep Over the Horizon," anyone who has ever seen in action the man at the association's 1946 helm knows that a pretty full view of the problems that are over the horizon will

RAYMOND MOLEY

be given by him if it is possible for anyone to know what is beyond. And of course, our chief executive will have pertinent comments to offer concerning the responsibilities and obligations of our industry in the period that lies ahead.

At a show I attended some years ago a stage character desiring to pay a titled personage a compliment, said "By jove, Duke, you are a prince!" From World War I, Mr. Henry emerged as a captain, and he has been familiarly called "Cap" ever since. President Henry has had a wealth of experience with the Signal Corps and with General Eisenhower in Europe. From the latter unpleasantness he came out as a full colonel. But, by jove, the colonel is still "Cap" to his friends in the industry, and he likes it that way!

The Washington legislative situation will be discussed at the conference by your executive vice president, who will also tell you telephone executives something about various other association activities upon which he thinks you should be brought down to date. The association's secretary, too, will have a message that will be interesting.

A word of caution should be given. The attendance at the executives' conference is going to be large, larger perhaps than ever before. Rooms will be scarce. For this reason we emphasize that the conference is one for the top managements of companies. If you, Mr. Executive, have made your hotel reservation and have received confirmation, be sure to take your written confirmation with you when you leave for Chicago. In order that accommodations may be available for the maximum number, please share your room with another if possible.

If you have not yet made request for a room reservation you should do so without delay. If you have made a request but have been advised that it cannot be met because no room is available, it will be very hazardous for you to go to Chicago in the belief that you can somehow find a place to sleep. We strongly recommend that you do not make the trip if you do not have a confirmed room reservation.

For those who make their reservations early and are able to obtain accommodations the executives' conference is going to be a great meeting with a fine program of outstanding speakers. The hotel corridors and rooms will abound in good fellowship.

Although there will be no telephone equipment exhibits at this conference, you may be sure that our friends, the manufacturers, will be on hand to discuss your supply problems with you and to lend you aid in their solution. They will also be available to participate in their traditional manner in the festivities of the occasion.

The date—April 16-17. The city—Chicago. The hotel—The Edgewater Beach.

Television

The first public demonstration of television transmission by radio was made by the Bell Telephone Laboratories, April 7, 1927, from Whippany, N. J., to New York City. Television by wire from Washington, D. C., to New York was demonstrated the same day.

*Today the Bell System is constructing a nationwide network of facilities which will be ready to bring "sight" programs to the stations on America's future television broadcasting chains.—**Bell Telephone Almanac.***

Listened to Sun Rays in 1880

It is stated that in 1880, the well known French physicist, Jansen, used the prototype of the telephone, called "photophone," to "listen to the rays of the sun and to the sun, itself." Nothing was heard then but when there was any change in the condition of the spots on the sun, Professors Jansen, Dumas, Bregget and Alexander Graham Bell, himself, heard sounds (which, by the way, originated on the sun three months before that, i.e., 92 days, six hours, 40 minutes and five seconds.)

Rural Line Service

By John D. Taylor CONSULTING ENGINEER

POWER line induction into telephone circuits is a phenomenon which has been experienced by most telephone companies. This form of induction is heard by listeners on telephone circuits so affected and is manifested as a hum or a combination of hums, generally spoken of as *noise*.

Noise of this character will vary in intensity and pitch, depending upon the power line and telephone circuit electrical characteristics, their physical relationship and numerous other factors. The action of the noise on telephone conversations will likewise change with the noise variations as it effects the telephone receiver to produce sound. Any foreign noise which the subscriber can hear will be detrimental in greater or lesser degree to conversation and frequently, if not controlled, may render speech unintelligible.

Power line induction in telephone circuits is thus a liability to the telephone company and should be avoided whenever possible. Where it is necessary to accept power line exposures to open wire telephone lines, suitable means should be mutually agreed upon by the power and telephone companies involved to properly control the resulting induction.

PART VI. Power Line Induction. The fifth article of this series appeared in the March 2 issue, page 24.

Theoretical Considerations

(1) General. Power for commercial use is generally transmitted over alternating current 60-cycle circuits at voltages up to a few thousand volts in cities and nearby communities. In the rural areas, however, electric lines carry single or multi-phase power circuits at voltages ranging from a few thousand to 100,000 volts or more. For economic reasons, the present tendency is to employ higher voltage circuits.

At the present time, interconnected commercial power line networks, serving large sections of the country, are in operation and will undoubtedly increase in number and size in the future. The Rural Electrification Administration has built other power line networks throughout the country to serve rural subscribers and small communities. These networks will no doubt continue to expand and serve new territories in the future. Telephone companies should recognize that if they do not have power line exposure problems at the present time, in all probability they will have to meet such situations in the not too distant future.

(2) Noise Induction. The usual fundamental power line frequency of 60 cycles is too low to be heard as noise in telephone circuits which, in general, pass useful voice frequencies ranging from about 250 cycles to about 2,750 cycles. However, power line voltages and currents include, in addition to the fundamental, a number of voltages and currents with frequencies lying within the voice frequency range and known as harmonics (multiples of the fundamental). These harmonics, as well as the fundamental, affect telephone circuits by magnetic and electric induction. The harmonics are, however, the noise makers. The nearer the disturbing harmonic frequency is to about 1,100 cycles (19th harmonic is 1,140 cycles) the greater the interfering effect, as shown in *Fig. 1.* This is caused by the fact that the normal ear is most sensitive to a given sound volume at about this frequency.

The greater part of power transmitted over the power circuit will be at the fundamental frequency, but for the higher voltage lines (above 5,000 volts) a very substantial amount may be transmitted at some of the harmonic frequencies. This power may range up to a few thousand watts. In general, the greater the power transmitted at harmonic frequencies, the greater will be the interference in the disturbed circuit. If an interfering harmonic current in a power circuit has an energy value of 100 watts and the inductive coupling between the power and the disturbed telephone circuit for that particular harmonic current is, say, 60 decibels, there will be induced in the telephone circuit a power energy at the harmonic frequency of 0.0001 watts, or 100 microwatts.

Since speech energy may reach levels as low as 10 microwatts or less, the induced noise energy of 10 times that amount probably would make the speech signals unintelligible, depending upon the harmonic frequency. In addition, other induced harmonic currents within the voice range would contribute their noise energies to the total noise in the telephone circuit, further reducing the possibility of hearing intelligible speech. The signal to noise ratio in decibels for typical power induction in a telephone circuit, measured with a standard noise meter, is the decibels corresponding to the ratio of the signal power to the noise power. Thus, in the above instance, the signal to noise ratio in decibels is

$$10 \log_{10} \frac{10}{100} = -10 \text{ decibels},$$

or a ratio of 1/10, whereas, for a satisfactory circuit design, this ratio should be +13 decibels or a ratio of 20/1.

(3) Low Frequency Induction. While 60-cycle power induction does not affect exposed telephone circuits as noise, it does present a problem of more or less seriousness regarding safety to persons and property. As mentioned above, the power circuit fundamental carries most of the transmitted power and by magnetic and electric induction impresses a 60-cycle voltage and current upon any paralleling telephone circuits.

The magnitude of the voltage and current induced by the fundamental in-

to the telephone circuit depends upon many factors, some of the more important relating to power being: (1) Voltage, number of phases, characteristics, extent and type of power system (isolated or grounded), (2) separation and length of parallel between the power and telephone circuits, and (3) length and characteristics of the telephone circuits. Due to the numerous factors involved, it is not ordinarily practicable to determine the severity of an exposure from the standpoint of low frequency induction without a detailed study of the complete data for the particular exposure. In many cases, knowing approximately the value of the more important factors in a given exposure, experience may roughly indicate as to what low frequency effects might be expected.

Under normal operation of the power line, low frequency induction usually is not dangerous or severe. When a fault occurs on a power wire, however, such as a ground on a phase wire in a three-phase grounded neutral system, (and the exposure to the telephone circuit lies between the source of power and the fault), a large current may flow over the power wire through the exposure and to ground at the fault. This sets up a very high magnetic field in the exposure, inducing a high potential to ground on the exposed telephone circuit.

This potential may be 1,000 volts or more which probably would operate, with some very slight delay, protective devices (open space cutouts and possibly fuses) on the telephone circuit. Some reduction of the induced potential to ground on the telephone circuit would momentarily follow operation of the cutouts, depending upon tne location of these devices with respect to the exposure. If a lineman happened to be working on the telephone wires in or near the exposure at the time the power wire became grounded, he might receive a very severe, if not fatal, shock. Therefore, it is necessary, where power exposures exist which may, during times of fault, produce dangerous voltages in the telephone circuits, that all practicable precautions be observed to protect telephone workmen and property from such hazards.

Induction Limitations

(1) Noise. For a number of years following the advent of commercial telephone service there were relatively few noise problems to contend with; however, with the development of high voltage networks throughout the country, particularly in the rural districts, power line exposures to open wire telephone lines increased at a rapid rate.

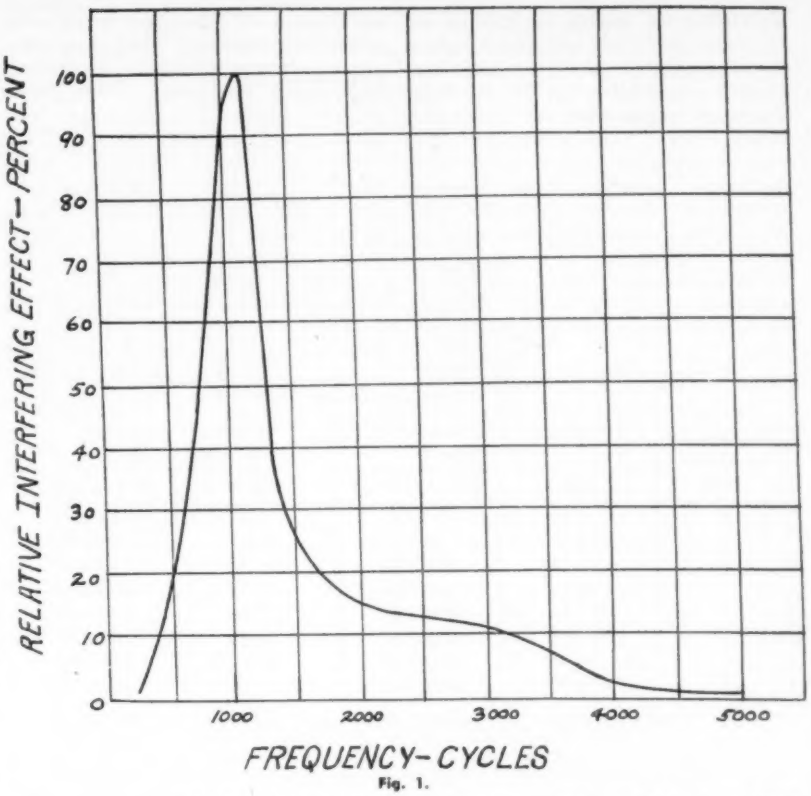


Fig. 1.

It was soon recognized that in dealing with the numerous noise problems a measuring stick and noise standards or limitations for telephone circuits would be required.

Early in the study of noise problems, measuring apparatus was developed to record noise values in terms of *noise units.* This apparatus employed a vibrating unit or standard associated with an adjustable potentiometer, calibrated in noise units. Measurements were made by listening first to noise in the telephone circuit, then to the noise from the noise standard through the potentiometer and adjusting the latter until the listener judged the noise from the standard to have the same interfering effect to conversations as the actual circuit noise. The number of noise units was then read directly from the calibrated dial on the potentiometer. This method was not only tedious and required taking circuits out of service, but, of greater concern, it required trained observers who, frequently having varied hearing characteristics, rendered different judgments for the same circuit noise.

After many years of experiment and trial, a satisfactory portable visual noise measuring set was developed, which is now in general use and which measures noise by means of a specially designed circuit and meter, calibrated to read noise directly in decibels.

This set does not depend upon the ear but provides consistent readings for similar noise conditions without removal of circuits from service. It is designed to indicate the magnitude of interfering effects on conversation for various types of noise and noise components and for different kinds of telephone sets. To accomplish this result it was necessary to incorporate in the set several "weighting networks" which serve to evaluate the incoming noise frequency components in accordance with their interfering effects for different types of circuits and telephone sets.

Reference noise was determined, after many observations, as the noise which could just be heard in a telephone circuit by the average listener with normal hearing in the presence of average room noise. As applied to this noise measuring set, reference noise is considered as the 0 decibel (DB) reading of the set, which is registered when a 1,000-cycle power of 10-12 watts (one micromicrowatt) is applied to the line weighting terminals of the set or is applied to a No. 144 (Western Electric) receiver with the set bridged across it. By means of a potentiometer and the meter scale, noise readings up to 95 decibels above reference noise (95 dbRN) or more can be made.

After extensive tests and observations had been conducted as to the effect of power line noise on the in-

telligibility of speech, certain values of noise were adopted, representing certain impairments to telephone conversations and being in effect the same as though transmission loss were added to the circuit. These values differ for various types of telephone facilities, such as toll circuits, tributary circuits, trunks and subscriber loops. For subscriber loops measured at the terminals of the telephone set or across the receiver terminals, *Table 1* shows the impairments both in dbRN (decibels above reference noise) and NU (noise units).

Noise Transmission Impairments (DB)	Subscriber Loops Measured at			
	Telephone Set Terminals—Line Weighting		Receiver Terminals—Receiver Weighting	
	dbRN	NU (Approx.)	dbRN	NU (Approx.)
0	0-20	7-70	0-17	14-100
1	20-23	70-100	17-20	100-140
2	23-26	100-140	20-23	140-200
3	26-29	140-200	23-26	200-280
4	29-31	200-250	26-28	280-360
5	31-33	250-310	28-30	360-440
6	33-34	310-350	30-31	440-500
7	over 34	over 350	over 31	over 500

Table 1. Noise transmission impairments in decibels above reference noise (144 equiv.).

From *Table 1*, it may be seen that transmission impairments begin in subscriber loops when the noise values in these loops exceed 20 and 17 dbRN as measured at the terminals of the telephone set and the receiver, respectively. More noise may be tolerated where there is sufficient margin available between the limiting and actual loop loss. In practice, however, each of the various parts of a built-up circuit connection will have some noise which may or may not contribute to transmission impairment of the conversation.

(2) Low Frequency. Where lower line faults involving exposures to telephone circuits occur, it is essential that the voltages induced in these circuits and to ground be controlled to the greatest practicable extent possible. The severity of low frequency induction primarily depends upon the maximum longitudinal (along the wires) voltage capable of being developed in the exposure and the frequency and duration of faults. Such a voltage may (1) result in operation of the telephone plant protectors, interruption of service, and (2) acoustic or electrical shock to employes or subscribers.

Telephone protector blocks (open space cutouts) for use in central offices and at subscriber stations usually operate at about 225 to 575 peak volts (average about 350 volts) whereas the wider air-gap blocks used at junctions of open wire and cable operate on the average at about 700 peak volts. If an employe or subscriber is listening when the protectors operate, acoustic shock may result due to the unequal discharge of the foreign current across the two airgaps (one from each side of the line) to ground.

Electric shock depends upon many factors, which may or may not be present at the time high foreign voltages are impressed upon the telephone circuit by induction or contact.

Generally, protective devices will operate to prevent electric shock at the central office or subscriber station. However, telephone linemen working on open wire circuits when the foreign voltage is impressed upon them may be fatally shocked or seriously injured by falling from a pole. If he is in series with a telephone conductor or part of his body is in contact with a conductor and also ground, such as a guy wire, he may receive the full longitudinal induced voltage. The effect upon the human body of electric shock depends principally upon the current passed through the body, its duration and path. It is known that 15 to 20 milliamperes of low frequency alternating current through an arm or leg will cause severe muscle contraction and less than 100 milliamperes through the body may cause death. It also is known that the impedance of the human body at low frequencies mostly is resistance, varying with contact conditions over a wide range from less than 1,000 to more than 100,000 ohms. With good contacts, a moist body resistance may not exceed about 3,000 ohms.

From the above, it will be seen that induced voltages in the telephone circuit of only a few hundred volts may be dangerous or even fatal to workers. While the permissible maximum impressed voltage on exposed telephone circuits under any conditions of power line faults will vary somewhat for different types of telephone plant and with the possibilities of damage to person or property, it is thought that such voltage should, in general, not exceed about 100 to 150 volts to ground.

Remedial Measures

(1) General. The most satisfactory arrangement for avoiding power inductive effects as well as contact hazards is adequate separation of the power and telephone lines. However, this method frequently is impracticable and is becoming more so as the two types of services expand. Cooperative advance planning will help to eliminate possible exposures.

(2) Noise. Metallic-circuit induction in balanced cable pairs usually is negligible under normal operating conditions. The grounded lead cable sheath provides an effective shield against this type of induction. Longitudinal circuit induction, if excessive in cable, may be reduced substantially by proper grounding of the cable sheath with respect to the exposure.

Exposed open wire sections of metallic telephone circuits may, in general, be transposed satisfactorily against power circuits by proper coordination. The transposition scheme given in PART V of this series of articles, if not sufficient to adequately control the induction, may be supplemented by the addition of whole line transpositions. These should be in all the circuits on a line and transpositions should be installed midway between the regular transposition poles throughout the exposure. Where these transpositions are not adequate, standard exposed line or special transposition schemes may be used.

Grounded telephone circuits cannot be transposed and should be made metallic at least through the exposure, but preferably throughout their total length.

(3) Low Frequency. Where exposures cannot be avoided, and where it is determined that dangerous induced voltages in the telephone circuits may result under some conditions of power line fault, the following steps should be of value in limiting such voltages:

(a) Power company should arrange its system and the operation thereof to
  (1) Hold fault current to a minimum.
  (2) Guard against frequency of faults.
  (3) Minimize duration of fault current.
  (4) Reduce ground return component of fault current.

(b) Telephone company should consider:
  (1) Installation of short-circuiting or arrester relays on the open wire telephone circuits to ground them during periods of high impressed potentials.
  (2) Temporarily isolating exposed open wire plant

(Please turn to page 49)

Shortage of men's clothing bothering Washington. . . . National Rural Electric Cooperative Association holds fourth annual meeting. Urges Bell System to double proposed expenditure of $100,000,000 for rural telephone promotion during next five years.

NOW THAT the threatened Bell telephone strike has been settled, for a year at least, let me tell you about something else which has been bothering Washington for the past fortnight and longer. It's clothes —men's clothes. This suit shortage situation is getting so bad here in the nation's capital that foreign diplomats and their staffs are reverting to their native costumes upon the slightest provocation, while the high-priced lawyers are threatening to wear their striped pants right out on the street instead of just for funerals and Supreme Court sessions (no connection, of course).

What's this got to do with the telephone business, you say? Well, have you ever called on an important business acquaintance or appeared at some distinguished gathering with rumpled or stained vestments, or none at all? Of course not. So what do you do when the cleaner can't deliver fresh garments in time for the important date? You telephone your regrets. You try to carry on your business by telephone. You try to stay out of sight as much as possible. Yes, business, social, political contacts — even romance (bless Cupid's little heart—he never had to call on a heavy date, dressed that way) have been placed on a part-time telephone basis, because the male population of Washington is suffering an acute clothing famine. Doubtless other cities are in just as bad a fix.

Just what this is doing to the telephone traffic load is problematical, but nevertheless real. (I tried to check on this point with the general commercial manager of the local telephone company, but he was out for the morning —probably home pressing his own pants, poor fellow.)

Your correspondent was at first inclined to pooh-pooh this claim that the men's clothing stores of Washington are stripped bare (and their customers pretty soon will be, and I do mean bare). I have always held that fine clothes make the man, provided the woman wears them. When several of my associates, recently separated from the armed forces, complained about being unable to find civilian duds, I told them loftily: "What can you expect, my gold button friends, with all this sudden competition in demand for men's suits of the same size range? However, it is only a temporary condition which will pass when production catches up a bit. Until then, you'll just have to be content with being a wolf in cheap clothing."

But the blow struck home last week when a combination of cleaning delays and sudden seam bursts left this writer the choice of attending a social function in either a light blue summer suit or nothing. Since "nothing" had to be obviously vetoed, in the public interest, your correspondent shivered through an entire evening in conspicuous discomfort, while some disagreeable orchestra kept repeating a most revolting song about "It might as well be spring."

The next day I nonchalantly informed one of my gold button friends that I was faring forth to buy a new suit. He snickered. Whereupon I pointed out: "Oh there may be some little trouble for you fellows of combat size, but for a party with my—ah—more mature personality, there should really be little difficulty."

The first haberdashery store I entered seemed to be undergoing redecoration. The walls were bare and two sleepy looking salesmen were sitting on a table playing gin rummy. I started to leave when one of the salesmen asked me what I wanted. I told him some clothes.

"We got some nice corduroy pants and sweaters."

"My good man," I said, "I did not want something in which to work in the garden or go fishing. I want a suit."

"A suit—a suit he wants!" exclaimed the salesman, guffawing most vulgarly to his fellow salesman. The latter picked up the deck of cards and held them out to me, saying:

"Here's your suit, mister, four of them. What'll you have—hearts, diamonds, spades or clubs?"

Well, that's the way it was all over town. It seems that all sizes are out of stock. It's serious. People are staying home from work and hiding out on the golf courses in slacks. And, of course, there's the telephone which has to take the rap.

What makes this situation more ironic is the fact that in the White House we have the first President of the United States who used to run a haberdashery store. How it must pain Harry S. Truman, who is so impeccable about such things as matching ties, shirts and hose — who arranges the points of his own breast pocket handkerchief so carefully each morning—to see the hordes of shabby looking men tramping up and down Pennsylvania Ave., in and out of the Executive Offices, State Department, etc.

It seems only yesterday that a nationally known Washington business letter inadvertently referred to Harry S. Truman as a sloppy dresser and got called down right hard for it. The editor was given to understand that the President did not mind having his politics, his foreign policy, his religion, personal habits, and even his wife and family held up to criticism or ridicule. Such is the price of fame. But breathe no breath of suspicion about the exquisite taste of the presidential four-in-hand or you'll be *persona non grata* at all press conferences.

Yet, today almost every man in Washington has an excellent start in his own clothes closet toward a career as a tramp. The other day a new federal judge was being inducted into office, amid flowers and friends, in his billowing black silken robe. A flippant girl reporter asked what he had on underneath that robe. The judicial visage became stern.

"This court," he said, "refuses to answer that question on grounds he might incriminate himself!"

* * *

Well, to get back closer to the telephone business, nothing much has happened in the Washington area during the past week, following the collapse of the Bell telephone strike threat. Anything after that probably would be viewed by the industry as an anti-climax anyhow. The Senate Labor Committee reported out the Wage-Hour Bill with the expanded exemption of telephone operators at exchanges with subscribers up to 1,000 stations. But that had been expected and already reported upon in this department some weeks ago.

The FCC got out a report last week mildly cracking the radio broadcasters over the knuckles for advertising abuses. But that is primarily the headache of the radio broadcasters. The FCC reminded the broadcasters that it had an over-all responsibility to consider how public interest is likely to be served by various broadcasting programs. It paid some tribute to the "self-disciplinary" efforts of the broadcasters themselves. But it served notice that it was going to ask applicants for broadcasting licenses in the future to state how much time was proposed to be devoted to advertising in any one hour; also served notice that subsequent checks would be made and that the commission's opinion of the particular broadcasting service would be formed accordingly, with reference to future regulatory determinations.

This is doubtless a hint to the broadcasters to get busy about cleaning up abuses growing out of soap opera, singing commercials, plugs for headache powders and worse, such as those program sponsors that you have to spell backwards.

No, outside of the strike situation, the real politico-telephone news during the past week was not made in Washington. It was made in Buffalo, N. Y., where the REA co-ops' trade association, known as the National Rural Electric Cooperative Association held its fourth annual meeting. One of the program features of this co-op convention was an address by Harold S. Osborne, chief engineer of the AT&T.

One tangible result of Dr. Osborne's address appeared to be the adoption of a resolution by the NRECA which urged that the Bell System double its proposed expenditure of $100,000,000 for rural telephone promotion during the next five years. The resolution also urged Independent telephone companies to set aside relatively favorable sums so that rural areas will have adequate telephone service in the future.

* * *

And now for a brief review of Dr. Osborne's address, entitled "More and Better Telephone Service for Farmers," which is well worth the attention of telephone folks generally. First of all, he pointed out that the commercial tele-

COMING CONVENTIONS

Tennessee Independent Telephone Association, Andrew Jackson Hotel, Nashville, April 2.

Nebraska Telephone Association, Paxton Hotel, Omaha, April 9 and 10.

Iowa Independent Telephone Association, Ft. Des Moines Hotel, Des Moines, April 11 and 12.

United States Independent Telephone Association Executives' Conference, Edgewater Beach Hotel, Chicago, April 16 and 17.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 23 and 24.

Indiana Telephone Association, Severin Hotel, Indianapolis, May 1 and 2.

Illinois Telephone Association, Pere Marquette Hotel, Peoria, May 8 and 9.

Wisconsin Independent Telephone Association, Park Hotel, Madison, May 14, 15 and 16.

New York State Telephone Association, Hotel Onondaga, Syracuse, May 22 and 23.

Pennsylvania Independent Telephone Association, Lawrence Hotel, Erie, June 4, 5 and 6.

Michigan Independent Telephone Association, Hotel Olds, Lansing, September 18 and 19.

United States Independent Telephone Association, Stevens Hotel, Chicago, October 14, 15 and 16.

North Carolina Independent Telephone Association, Pine Needles Hotel, Southern Pines, November 11 and 12.

Alabama Independent Telephone Association, Jefferson-Davis Hotel, Montgomery, November 18 and 19.

We are contented because we are happy, and not happy because we are contented.

W. S. Lander.

phone companies always have tried to assist telephone co-operatives in the rural field because the latter, since the beginning of this century at least, have played an important role in rendering communications service to the farmers. Out of about 2½ million telephones now in service in "rural areas," he estimated that approximately three-quarters are being serviced by commercial companies and one-fourth by telephone co-operative associations. Yet, *while rural telephone development in the United States is thus higher than anywhere else in the world, the telephone industry still would like to see it developed even more, according to Dr. Osborne.*

More modern improvements, wider use, and other betterments of service, commensurate with the great gains made in recent years in rural electrification, he said, should aid progress toward this objective. He stated:

"In what I have to say on this subject, I will speak specifically of the plans of the Bell telephone companies whose service areas include about one-half of the rural areas of the country. In addition to the Bell companies, there is a large number of Independent companies whose service area includes the other half of the rural areas of the country. For the purpose of service, all of these companies, Bell and Independent, work together and with the service line groups provide one great nation-wide telephone system. I'm not authorized to speak for the Independent telephone companies, but know that they are working actively on plans for extending telephone service in the rural areas which they serve to the same end of increasing telephone service in these areas as rapidly and as much as possible.

"The rural areas served by the Bell companies include approximately 2,500,000 farms with dwellings. Of these, over 80 per cent can be served from present telephone lines with no charge to the customer other than the normal installation and monthly charge for service; that is to say, that they can be served without paying a charge for the construction of the lines. This comes about because the telephone companies and the service line companies together have built about 350,000 miles of rural telephone pole lines in these areas and because the telephone companies generally speaking extend their lines without construction charge to any customers that can be reached where the new construction does not exceed one-half mile of pole line per customer."

It was pointed out that *a little less than half the residents of rural areas to which such service is available without construction charge now are taking it.* Requests from farmers are coming in steadily and the Bell System hopes that service connections can be increased rapidly as manpower and materials ease up. But it is the remaining 20 per cent—those who are not presently within connecting distance of existing Bell telephone facilities (without construction charge), who are receiving special attention. Dr. Osborne said on this point:

"One important development which already was in use before the war was the use of high-strength steel wires and long spans, a form of construction similar to that used in rural power construction. By reducing the number of poles from an average of 30 per mile to an average of 17 per mile, a considerable reduction in cost is achieved and distant groups can be reached more readily. Along with this long span construction the telephone companies have developed improved construction methods and equipment. Straight lines across private right-of-ways, rather than following roadways, are used where cost saving results from the reduced amount of guying and of tree trimming. We are just completing the development of light duty mechanical pole hole diggers particularly designed for rural lines.

"The telephone companies experimented before the war with buried wire. Special moistureproof types of insulation and mechanical protection are required. The wire is buried by a special form of wire burying plow which produces a furrow, feeds the wire into the bottom of the furrow and closes the furrow—all in one operation. Improvements in this form of wire, based on the prewar experience, now are being developed and we believe that it will have an important field of use where only one or two pairs of wire are required and where the conditions are favorable to plowing."

The speaker referred to radio-telephone experiments in remote farm areas, such as a project recently installed between the town of Cheyenne Wells, Colo., and eight ranches at a distance of 12 to 20 miles from that town. But he saved until the last his review of joint power and telephone developments which naturally would be of special interest to the REA co-op members in his audience.

First, Dr. Osborne touched on the item of the joint use of the pole line for power and telephone wire. There has in the past been difficulty in such practice (except for short distances) because rural telephone wire generally is not sheathed as it is in city areas, and rural power lines commonly carry higher voltages than urban area distribution lines. But recent experiments on lines of both rural electrification co-ops (in cooperation with REA) and of business-managed power companies (in cooperation with the Edison Electric Institute) have shown that under proper conditions joint telephone-power use of rural pole lines for construction is feasible, practical and economical. The speaker mentioned especially experiments on lines of the Alabama Power Co. at Selma, Ala., the Lake Region Electric Cooperative at Webster, S. D., and the Southwestern Minnesota Cooperative at Pipestone, Minn.

As to the "carrier telephone," of which there has been so much recent publicity, Dr. Osborne said:

". . . These devices will not interfere with the power line, but add something to the cost of the system. The proposal is that the devices connected to the power line should be installed and maintained by the power people, at the telephone company's expense, and that telephone companies would provide and maintain the carrier apparatus at both ends of the line, as well as the rest of the telephone line and equipment. Power for the operation of the carrier equipment and the telephone are taken from a convenience outlet on the premises.

"The present prospect is that with the minimum prices which will result from quantity production, the carrier telephone system may be cheaper than building a new telephone line where the distance between telephone customers averages one-half mile to a mile or more, but that this system will not be economical in areas where the density of telephone development is greater. The field of application of the system is not yet certain, however, as it will depend upon how low the cost can be made when the carrier apparatus is in large-scale production.

"The Bell Telephone System has arranged to proceed at once with the production of this system. First units will be available in June and general factory production available in late summer. The Bell companies intend to make this equipment available to Independent telephone companies and also to service line groups connected with either Bell or Independent companies. They also have offered to Independent telephone manufacturers a royalty-free license under Bell System patents for the construction of this type of equipment. We believe that in many places this development will make an important contribution to the problem of giving telephone service to everyone who wants it."

He said the Bell System hopes to raise the net increase in rural subscribers to 250,000 a year by the end of 1946. Independent telephone companies doubtless are doing their share as well, since the Independents operate (proportionately according to subscriber classification) in rural areas, even to a greater extent than the Bell System.

Dr. Osborne reminded his audience that telephone service and power service are not competitive but are supplementary. Each helps the other. The power service helps the farmer to greater production; telephone service helps to sell his products and buy what he needs.

AT&T ANNUAL REPORT REVIEWS POSTWAR PLANS

THE Bell System has made a substantial start in its announced program to extend telephone service to another million subscribers in rural areas in the next three to five years, President Walter S. Gifford of the American Telephone & Telegraph Co. stated in his annual report to AT&T stockholders for the year 1945.

The increase in 1945 in the number of rural telephones served by Bell companies was next to the largest ever achieved. Studies on the ground were completed in about 1,500 representative rural exchanges throughout the Bell System to determine the extent of the rural market and the amount and type of plant required. Likewise, the views of thousands of rural customers were obtained regarding their servicing preferences.

"Development of improved and more economical methods of providing rural telephone service has been advanced substantially. Activities to improve the quality of rural service also were started, including reducing the number of parties on lines, improving transmission and installing the latest types of telephone instruments.

"Two field trials of a rural power line carrier telephone system were started in the latter part of the year. These trials form part of the Bell System's joint programs with the Rural Electrification Administration and private power companies to determine the feasibility of transmitting speech and electric power simultaneously on the same wires to provide telephone service to farms at a distance from existing telephone lines.

"In cooperation with the Rural Electrification Administration and private power companies, trials also were started on the use of new methods and materials which may make it practicable to use the same poles for both telephone wires and high voltage power wires in rural areas," Mr. Gifford said.

Toll Line Dialing

Mr. Gifford stated that as another important postwar project of the Bell System, it is planned to introduce methods and equipment which will enable long distance operators to dial calls directly through to the called telephone even though it be at the other side of the continent. The result is expected to be improvement in speed, accuracy and reliability of long distance service and in over-all economies of operation. The plan provides for the inclusion of central offices of Independent connecting telephone companies which desire to participate. About 5 per cent of Bell System toll switchboards already are handled by direct operator dialing in limited areas.

Reducing Backlog

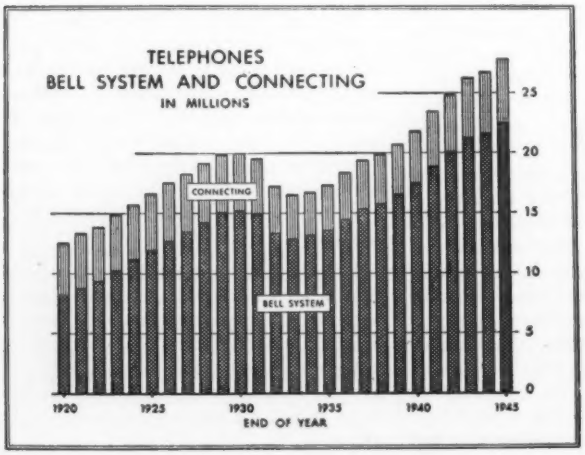
"As the nation turned from war to peace, demands upon the Bell System for telephone service increased sharply beyond even the previous peak levels reached in wartime. Accordingly, the American Telephone & Telegraph Co. and its associated companies furnished more domestic and overseas communication service in 1945 than in any other year," Mr. Gifford stated.

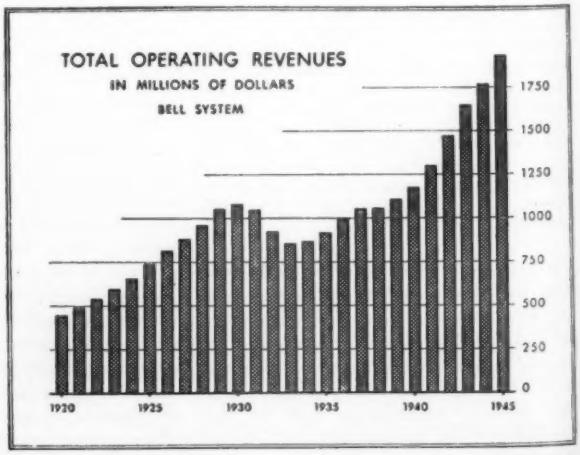
"With the end of demands on the system to produce great quantities of electronic and communication equipment for the armed forces, the entire organization swung into a program to give telephone service with all possible speed to waiting customers whose orders have been delayed by shortages of facilities caused by the war.

"This program is the first order of business and is being pushed with the same energy that the Bell System organization exerted to provide the communication services and combat equipment needed to help win the war. Large installation forces are being augmented steadily and their work especially organized to provide service in double-quick time.

"As evidence of accomplishment, the gain in telephones in the last quarter of 1945 alone was 560,000, by far the highest in any quarter in history. Increases currently are running at the rate of about 250,000 a month, or 3,000,000 a year, which is more than twice the largest annual gain ever recorded. This record-breaking pace of installation work already has enabled the system to provide service to a substantial proportion of the customers who have been waiting a long time. However, since the end of the war the volume of new orders for service likewise has broken all records, so that the total number of held applications for main service—including those just added to the waiting list—is still very large. By the end of 1945, this total had been reduced to 2,000,000 from the peak of 2,170,000 reached in September. Steady reductions are expected each month, with the emergency program continuing in full force until the last waiting customer has been served and all telephones once again are installed promptly on request.

"Use of toll and long distance service also set new records in 1945. De-





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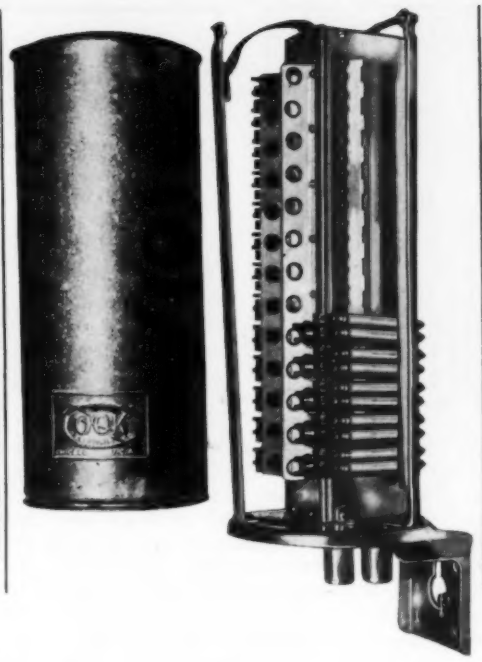

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The UA-20 offers many advantages. By simply removing the fuses the overhead and the underground cables are quickly disconnected, permitting testing in either direction. Special test clips with fuse clip adapters and cords are furnished. Service is re-established by reinserting the fuses into the heavy spring clips, which insures constant electrical contact and no resistance loss, an important feature in toll cable transmission.

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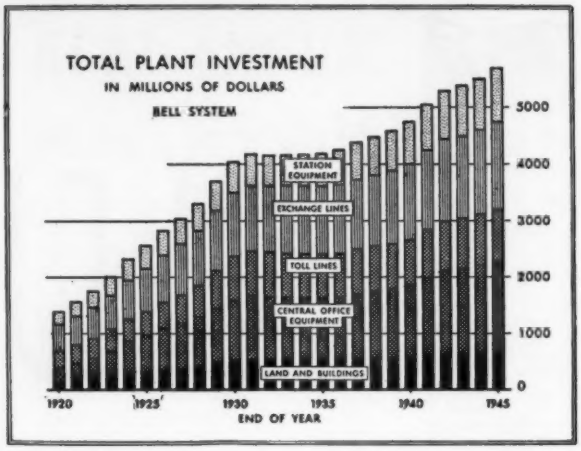
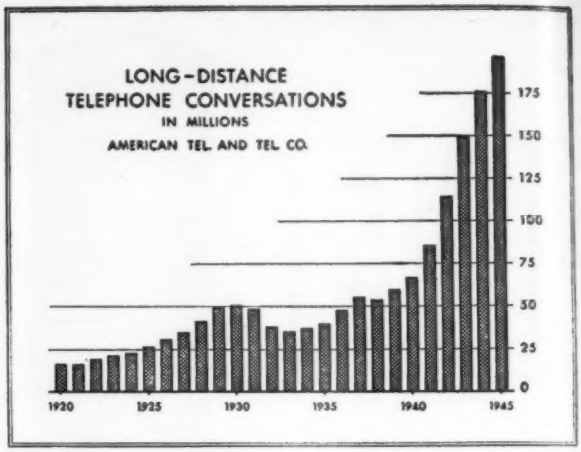




spite construction of much new plant, the load on long distance facilities continued to be excessive. The system now is engaged in the largest intercity construction program in its history and is introducing new types of plant and new operating methods for the purpose of not only restoring, but bettering the service standards achieved before the war," the annual report said.

Under Private Enterprise

"All the talents and physical assets of the Bell System have been developed under our system of private enterprise in the American atmosphere of freedom. This has produced the best telephone service in the world—a service that in extent and speed far surpasses that of any other nation. Ability and initiative have been encouraged and supervisory and management positions have been filled from the ranks. Over a period of many years the system has been free, under regulation, to earn enough to pay good wages with a return to investors sufficient to attract the new capital needed for expansion. This capital has been used to build increasingly better telephone plant which has been operated by increasingly efficient methods. Telephone users have had ever-improving service while the price has been reduced; telephone employes have had good wages which have risen in keeping with progressive wage standards, and telephone stockholders have had a steady return on their savings invested in the business.

"Today, in the aftermath of war, the nation is exploring its resources and working toward a new equilibrium. The problems of human and physical readjustment have closely affected the Bell System as they have all business. These problems demand—and they are getting—the utmost effort in order to insure the rendering of good telephone service all the time. The management of the company was never more mindful of its duty to meet its public service obligation fully and to see that the message gets through. It looks forward to providing more service and better service, more jobs and better jobs, than ever before," Mr. Gifford said.

In rendering efficient telephone service to the public, Mr. Gifford paid tribute to the Independent industry, stating that "as in previous years, there was cordial and effective cooperation between the Bell System and the 6,000 independently owned connecting telephone companies which operate more than 5,400,000 telephones in all parts of the United States.

Earnings, Expenses Up

There were 22,445,500 Bell System telephones in service at the end of 1945, an increase of 865,200 for the year, as compared to an increase of 333,700 in 1944.

Bell System operating revenues in 1945 were $1,930,889,000, an increase of $161,185,000, or 9.1 per cent over 1944. Operating expenses before taxes increased $137,604,000, or 12.1 per cent. Total income available for interest and dividends amounted to $230,405,000, which was $5,619,000 more than in 1944. Interest charges were reduced by $1,775,000. Net income of the system applicable to American Telephone & Telegraph Co. stock for 1945 was $177,058,000, or $8.93 per share, compared with $8.89 in 1944. The average number of shares outstanding increased from 19,099,723 in 1944 to 19,820,883 in 1945 as the result of bond conversions.

Net income of the company for 1945 (which includes the company's interest in earnings of subsidiaries only to the extent that such earnings have been received as dividends) was $8.66 per share, compared with $8.54 per share in 1944.

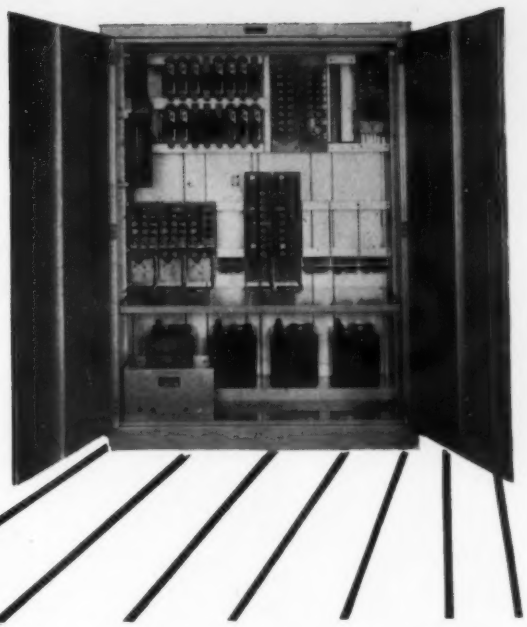
"Bell System earnings during the war years have been subnormal. During the four years beginning with 1942, earnings on invested capital averaged only 5.5 per cent, the lowest in the history of the system, except during the worst years of the depression in the early 1930's. With the volume of business and operating revenues at record levels in 1945, earnings on the total capital invested in the business were still only 5.5 per cent.

"The Bell System will require substantial amounts of new capital to finance the construction program which lies ahead of some two billion dollars to be spent as rapidly as it can get equipment and material manufactured and put in service. Already large amounts of equipment are being installed to meet back-up service demands, to restore normal telephone plant margins and to take care of growth. In addition, there probably never has been a time when there have been more new developments capable of being translated into better and more valuable service for telephone users. If the large sums necessary for such a program are to be obtained when needed and at a reasonable cost, earnings must be maintained at adequate levels. Those with funds to invest are free to go where the record and the prospects look best. The system's earnings during the four war years have been lower than will be necessary in the period ahead if its credit is to be kept on a sound basis and the new money required for postwar construction obtained. Jobs and better telephone service, as well as dividends, are dependent on adequate earnings," Mr. Gifford stated.

Taxes Continue High

Taxes for the Bell System, including the Western Electric Co. and the Bell Telephone Laboratories, amounted to $466,029,000 in 1945, compared with $514,393,000 in 1944. Of these amounts, $307,107,000 in 1945 and $360,138,000 in 1944 were payable to the fed-

Attract New Income
Promote PABX's



There is a fine opportunity for every telephone company to realize additional income in the years ahead, by promoting the installation of Automatic Electric P-A-B-X's. The number of "live" prospects is large—including factories and business houses which are already "sold" on interior telephone service but have not been able to obtain installation during the last few years.

Automatic Electric P-A-B-X's provide the lightning-fast intercommunication these subscribers are looking for. And in addition they provide central-office trunk service on outgoing calls, and incoming service through an attendant (or if desired on some of the systems, this service can be provided without a regular attendant— an ideal arrangement for smaller organizations). Thus, the P-A-B-X is not only an interior telephone system, but a complete, coordinated system of telephone communications.

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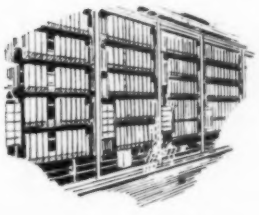
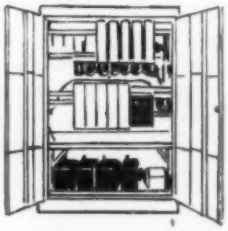
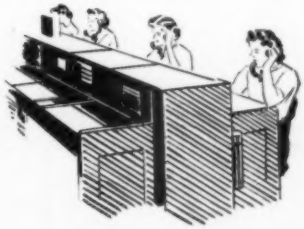


CENTRAL-OFFICE EQUIPMENT—Economically provides every wanted service, on a modern scale, in exchanges of every size, and with maximum flexibility for meeting growth or change in traffic or stations.



COMMUNITY AUTOMATIC EXCHANGES — These unattended dial exchanges make small exchanges profitable, solve the "operator problem," and improve service on both local and long-distance calls.



TOLL SWITCHING EQUIPMENT—To meet every modern operating requirement. Speeds up toll service, improves toll line efficiency, saves operating costs.

PRIVATE AUTOMATIC BRANCH EXCHANGES—Provide your business subscribers with fast dial connections on local calls, and improved service on city and long-distance calls.

eral government. Total taxes, which amounted to $15.09 a share of American Telephone & Telegraph Co. stock in 1941, amounted to $22.83 a share in 1945.

In addition, certain excise taxes paid by the users of telephone service are collected by the telephone companies and turned over to the federal government. In 1945, such taxes amounted to $290,000,000. During the four war years ending with 1945, the total taxes paid by the Bell System to the United States Treasury, including those collected from customers, amounted to more than two billion dollars.

Toll Service

The number of toll and long distance messages in 1945 was about 1,543,000,000, or 13.2 per cent above 1944. Long distance conversations handled by the Long Lines Department increased to nearly 200,000,000, about 11.6 per cent above 1944. Notwithstanding this large increase in volume, long distance calls were handled at almost the same average speed as in 1944. Nearly 85 per cent were put through while the customer remained at the telephone and 95 per cent within less than 10 minutes. This is not up to prewar standards and every effort is being made to improve it. The speed of service on teletypewriter exchange calls, which interconnect the typewritten word as telephone calls do the spoken word, was improved to 1.5 minutes, about the same as before the war.

Plant and Facilities

Total expenditures for new construction were $255,000,000 in 1945, compared with $170,000,000 in 1944 and $154,000,000 in 1943. Exchange plant construction, including installation of equipment at customers' premises, accounted for $165,000,000 of 1945 expenditures and $90,000,000 went into additional toll and long distance circuits and associated switching equipment.

Investment in Bell System telephone plant at the end of the year totaled $5,702,057,000, an increase of $189,662,000 during 1945. Depreciation and amortization reserves were $2,051,763,000, or 36 per cent of the plant investment.

"Additions to toll and long distance circuits in 1945 were the largest ever made in one year and amounted to 2½ million miles, but even this was not sufficient to catch up with the continually increasing demand. At the end of the year, about four million additional circuit miles still were needed to restore service to normal.

"The coaxial cable network was substantially expanded. This is a form of facility suitable for both telephone and television transmission. In fact, the coaxial cable between New York and Washington now is being used experimentally by several television broadcasters on a regularly scheduled daily basis. By the end of 1945, 2,200 route miles of coaxial cable had been manufactured and about 1,600 miles placed. During the year, circuits were operated over the newly installed Atlanta-Jacksonville coaxial cable. Work was pushed ahead on the transcontinental coaxial system and telephone service to Los Angeles over this cable, which follows a southern route, is expected in 1947.

"Besides the coaxial cables mentioned above, other extensions of the toll cable network covered more than 1,000 route miles. These brought the total cable network up to more than 35,000 route miles.

"Work is moving ahead steadily on an experimental radio relay system between New York and Boston, of a type suitable for telephone or television transmission and plans recently have been made for the construction of a similar system between Chicago and Milwaukee. Present indications are that radio relay systems, as well as coaxial cable and possibly other methods, will play an important part in the extension of Bell System facilities capable of carrying television as well as telephone service," the AT&T president said.

Stockholders

The number of stockholders of record increased by 15,884 during 1945 to a total of 683,897 at the end of the year. Half of the stockholders have held shares for 10 years or more. The average number of shares held at the end of 1945 was 29.5, with no stockholder holding as much as one-half of 1 per cent of the total stock. Holders of one to five shares numbered 208,600, and 645,100 stockholders held less than 100 shares each. Holders of 100 shares or more each, including insurance companies and many other institutions representing large numbers of individuals, totaled 38,800 and held 47 per cent of the stock. Approximately 55,000 Bell System employes own stock in the company.

Toll Rates Down

"While prices of most things increased during the war years, telephone rates did not. On the contrary, long distance interstate rates have been reduced substantially. Viewing Bell System earnings as a whole, there is nothing in the present or near future outlook that would justify any rate decreases whatever. Earnings on the interstate portion of the business have been abnormally affected by the extraordinary volume of long distance calls and by the temporary overloading of the long distance plant due to shortages of new equipment during the war period. This interstate business is under the exclusive regulatory jurisdiction of the Federal Communications Commission which has insisted that earnings of such business should be considered by themselves, regardless of over-all system earnings.

"During 1945, two major reductions in rates for these services were agreed upon. On July 1, reductions amounting to $21,000,000 annually were made on the longer haul traffic. In November, further reductions in rates for certain interstate services were agreed upon, to be effective February 1, 1946, amounting to over $20,000,000 annually," Mr. Gifford said in his annual report.

Employes Increase

At the end of the year, there were 474,500 employes in the Bell System, including Western Electric Co. and Bell Telephone Laboratories. This is the largest number of employes in the history of the business and represents an increase of 34,800 over 1944. Of this total, 64 per cent were women, as compared with 68 per cent at the end of 1944. To replace losses and secure the required increase in personnel, it was necessary to employ more than 209,000 people, 83 per cent of whom were women.

The total payroll of the Bell System for 1945, including the Western Electric Co. and the Bell Telephone Laboratories, was $1,190,546,000, an increase of $116,618,000 over 1944.

"During 1945, wage increases totaling $124,515,000 on an annual basis have been put into effect. These increases include postwar wage adjustments agreed to in nine companies which total $36,575,000 on an annual basis.

"Postwar wage negotiations have been concluded or are under way in all companies. Wage progression increases normally made as employes' services and experience increase and not included in the wage increases referred to in the preceding paragraph, amounted for the year 1945 to $24,000,000. For the third successive year, the schedules of pay for Bell System employes have increased above those for all preceding years," according to Mr. Gifford.

Employes in the Services

Twelve hundred and thirty of the system's employes have given their lives for their country.

During World War II, a total of 67,700 Bell System employes have en-

(Please turn to page 48)

THIS IS THE MOST DEPENDABLE TELEPHONE DRY CELL MADE

•

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THE PLANT MAN'S NOTEBOOK

BY RAY BLAIN • TECHNICAL EDITOR

RECENTLY there was advertised a reconditioned plug seat switch. These switches are equipped with two sets of "make" contacts which are open when the cord and plug are in normal position and closed when the plug is lifted from the plug seat. We are forced to admit we have never seen switches of this type and do not know how they are used. We assume they could be used to operate peg count meters, start ringing machines, etc. If any of the old timers have had experience with this feature, we should be pleased to hear from them.

* * *

Interesting tests can be made with a recorder and a microphone to prove the inefficiency of some telephone pay-station booths. When a party is using a pay-station, start the recorder and hold the microphone at various points about the booth. It is surprising to note the good voice recordings which can be made in this manner.

* * *

According to *True* magazine in New York City, by dialing a certain private telephone number, anyone needing spiritual uplift can receive a two-minute sermon spoken by a minister or one of his assistants. Having other means of support, these people make no demands on the caller, not even asking his name, and they have served as many as 300 persons a day.

* * *

Experience gained during the war by the armed services indicates clearly that the four-wheel drive telephone construction truck has many advantages over the two-wheel drive type. Construction trucks often must leave the paved highway and plow through sand and mud or travel over rough terrain. When the four-wheel drive is used, it has been found that seldom can a truck be placed in a spot where either the front or rear wheels cannot get traction. In other words, the four-wheel drive trucks seldom get stuck.

* * *

There has been developed recently an all metal ball-pein hammer which should prove popular for certain kinds of work in the telephone industry. The flex-o handgrip, shaped to fit the hand, also

absorbs shock of hammer blows. The all-steel handle is unbreakable, can't burn or split and will never loosen from hammer head, for there are no wedges to come off.

* * *

A recent press release describes a machine, developed by Prof. H. J. Dana, director of the engineering experiment station at the State College of Washington, capable of determining the internal condition of wooden telephone and light poles to guide repairmen in maintenance of poles.

This "pole soundness tester" was designed to prevent interruption in communication sometimes caused by internal rot of wooden poles. The new instrument does not require a highly skilled operator and weighs about 20 lbs.

This appliance is clamped to the side of a pole; then the operator, by turning a crank, drives a specially shaped screw prod through the pole. A graph records the resistance to the prod as it goes through the sound and rotted portions of the pole. Records can be made of the surface rot, the amount of heart rot and the sound portion remaining which represents the service life of the pole. Preparation and testing of a pole requires about 20 minutes time.

* * *

I wonder why no one has ever designed a visual as well as an audible signal for use on an ordinary desk telephone. The lamp signal and relay serves a useful purpose, we admit, but this is a cumbersome and rather involved installation. We have visions of a shutter arrangement built-in and forming an integral part of an ordinary telephone.

Such an arrangement would serve many useful purposes. When several different instruments are installed in one locality, it would be easy to determine which one was ringing. Then, also, when returning to the office or home, one could determine at a glance whether or not a call had been attempted during his absence. Further, the called party might have an idea who wanted him and could either call back or avoid him, as necessity might indicate. We believe the shutter should come down or register and remain in an operated position until the handset is removed from the cradle, and replaced at such time as the shutter automatically would be restored.

[NOTE: "Plant Man's Quiz" on page 32.]

On Thursday, March 30, 1933, another engineering achievement was recorded. Direct telephone communication was established between the United States and the Philippines. Before 10 years had passed it became a wartime weapon of vital importance, and was one of the last connecting links with our island forces.

Today, telephone communication—throughout the world and at home—is being restored to the high standards of service, traditional with telephone companies throughout the years. As in the past, steady advancement continues to be a ruling factor in the telephone tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exides have been proving themselves worthy of that trust.

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TELEPHONE BATTERIES

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PLANT MAN'S QUIZ

Q. What is the advantage, if any, of having a condenser in series with the ringer on a rural line magneto telephone? If there is some advantage in the use of a condenser for this purpose, why are they not built in by the manufacturer? What size condenser should be used?

A. The principal advantage of a condenser in the bell circuit of a magneto telephone, in our opinion, is to make testing from the central office more convenient. If condensers are connected in all bells on a line, then a capacity kick will register on the wire chief's voltmeter and any leak can be detected instantly.

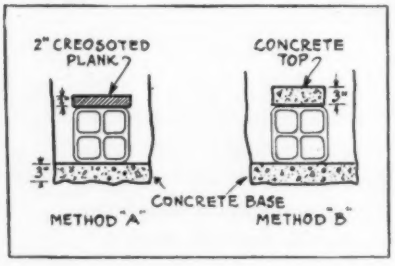
Although we are not certain, it is believed that any of the manufacturers will be glad to equip their telephones with condensers in the bell circuits if called upon to do so. Some manufacturers, we know, provide a loop in the wiring which may be cut to connect a condenser, if desired.

The size of a condenser for this purpose is not critical and ordinarily a one-half or one MF condenser will prove adequate.

* * *

Q. When required, what kind of top protection is used for vitrified clay conduit?

A. The following sketch indicates two methods of using a creosoted plank and concrete for conduit top protection.



* * *

Q. What should be the resistance of a ringer in a magneto telephone designed for rural line service?

A. The resistance of the ringer varies with the different manufacturers and, in general, ranges from 1,000 to 4,250 ohms. However, the impedance of these ringers to voice frequency currents is approximately 30,000 ohms. It can be seen, therefore, that a ringer bridged across the line over which a conversation is taking place does not cause serious transmission losses.

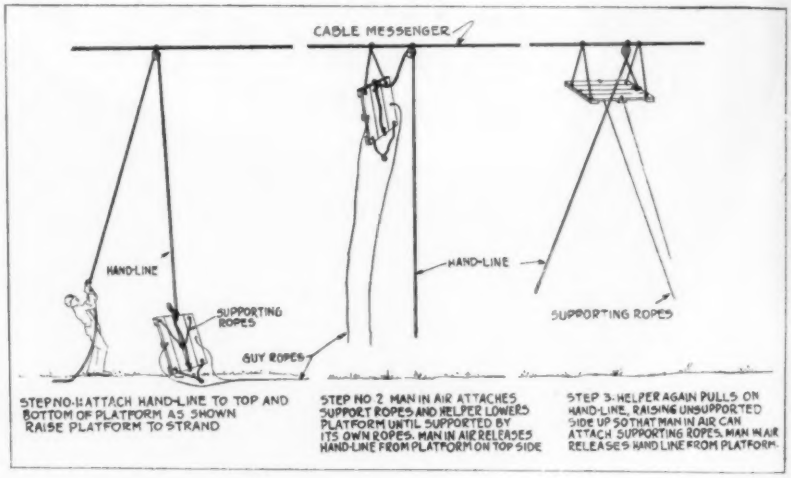
* * *

Q. What is a "subscriber's loop?"

A. This part of the telephone plant usually is referred to as the pair of wires used to conduct voice currents from the protectors at the central office to the subscriber's telephone. This loop may consist of cable pairs, open wire or drop wire.

* * *

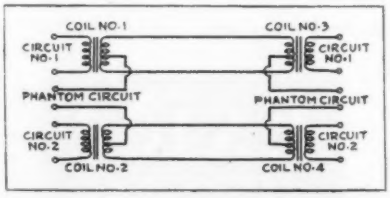
Q. Please describe the best and safest method of placing a cable splicing platform in position on a messenger strand.


CABLE MESSENGER
HAND-LINE
SUPPORTING ROPES
GUY ROPES
HAND-LINE
SUPPORTING ROPES
STEP NO-1: ATTACH HAND-LINE TO TOP AND BOTTOM OF PLATFORM AS SHOWN RAISE PLATFORM TO STRAND
STEP NO 2 MAN IN AIR ATTACHES SUPPORT ROPES AND HELPER LOWERS PLATFORM UNTIL SUPPORTED BY ITS OWN ROPES. MAN IN AIR RELEASES HAND-LINE FROM PLATFORM ON TOP SIDE
STEP 3-HELPER AGAIN PULLS ON HAND-LINE, RAISING UNSUPPORTED SIDE UP SO THAT MAN IN AIR CAN ATTACH SUPPORTING ROPES. MAN IN AIR RELEASES HAND LINE FROM PLATFORM.

A. The drawing above indicates a three-step method of how this operation may be performed.

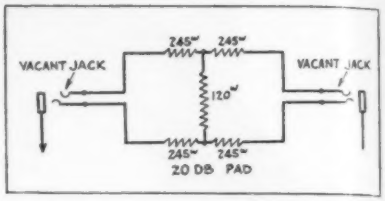
* * *

Q. How may repeating coils be connected to provide a phantom circuit on two metallic lines?



A. The approved hookup is indicated in the above sketch. The circuits must be transposed properly if the phantom circuit is to be noise free.

Q. How may we use 20-db attenuation pad for testing on a small switchboard?



A. The requested information is shown in the above sketch. The 20-db pad can be made up locally or purchased from any telephone supply house.

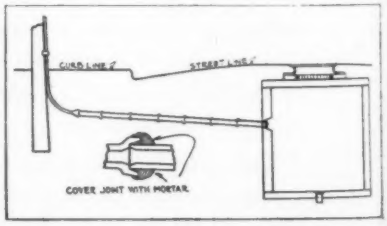
* * *

Q. What is the difference in filters and pads from a transmission standpoint?

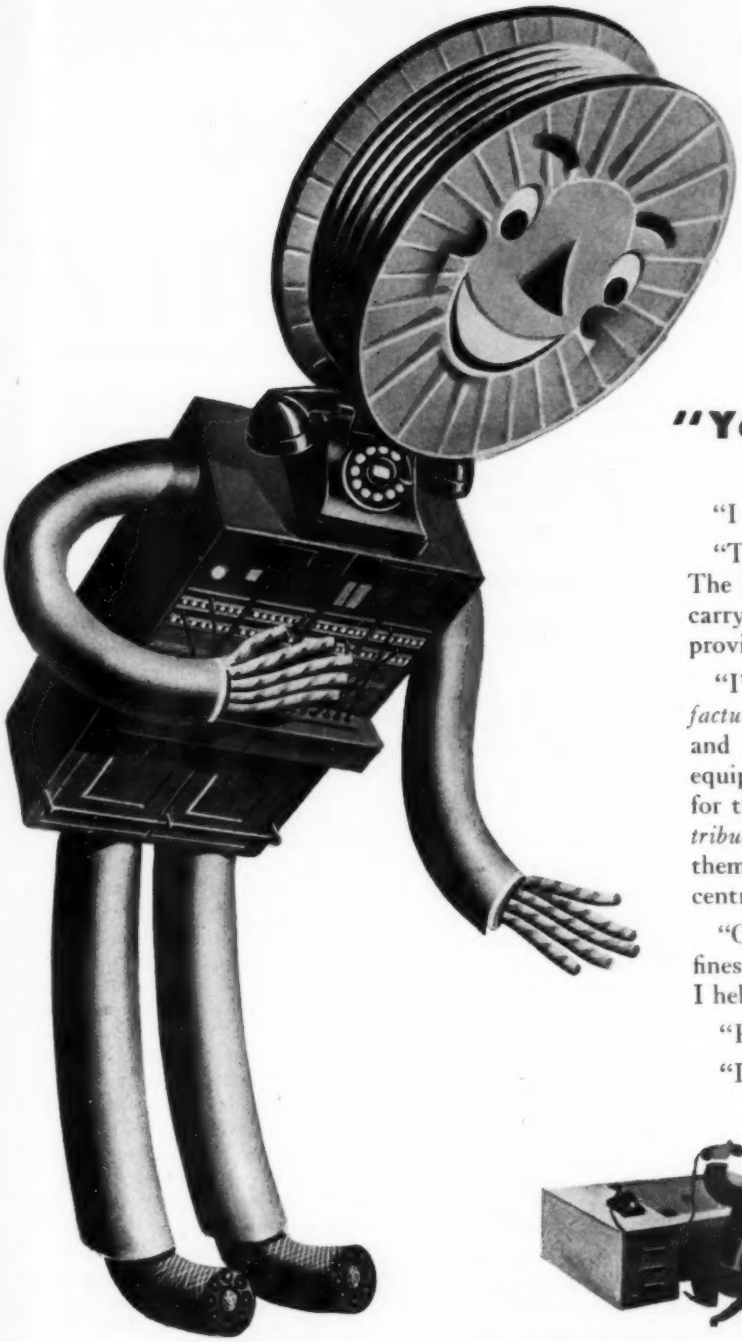
A. Filters and pads are similar except that pads are designed to effect approximately the same loss at all frequencies while filters are arranged to effect high losses at some frequencies and low losses at other frequencies.

* * *

Q. How should a lateral conduit and a pole riser duct be connected to a manhole?



A. The necessary information is furnished in the above sketch. The material shown is standard and can be procured from any telephone supply house.



"You rang for me?"

"I have been working for you for years.

"That telephone in your hand, I made. The long thin wires, the stout cables that carry your voice at the speed of light . . . I provided them, too.

"I've been busy . . . since 1882 . . . *manufacturing* telephones, switchboards, cable and other Bell System apparatus and equipment. I *purchase* supplies of all kinds for the Bell Telephone companies . . . *distribute* all this material and equipment to them throughout the nation. I *install* central office switchboards.

"Our nation's telephone service is the finest and most economical in all the world. I help make it possible.

"Remember my name . . .

"It's Western Electric."

MANUFACTURER... of 43,000 varieties of telephone apparatus.

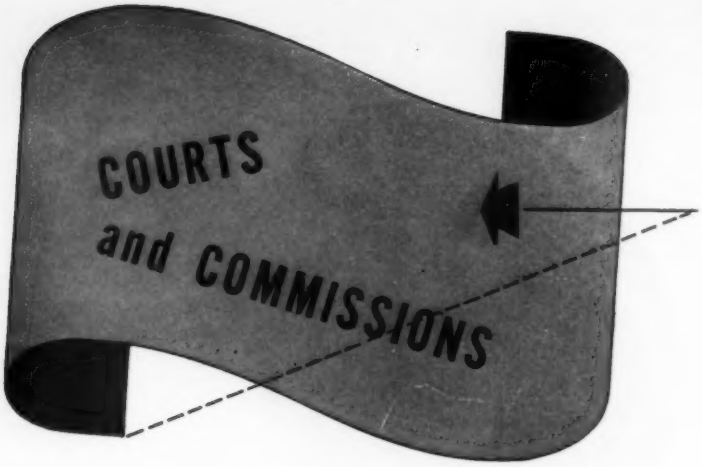
PURCHASER... of supplies of all kinds for telephone companies.

DISTRIBUTOR... of telephone apparatus and supplies.

INSTALLER... of telephone central office equipment.

FOR THE BELL SYSTEM

Western Electric



Date Set for Rate Hearings, Territorial Dispute

The Angus-Tabor Telephone Co., Angus, Minn., filed an application for rate increases with the Minnesota Railroad & Warehouse Commission on March 6 and at the same time filed a complaint, alleging property invasion, against the Tabor Telephone Co., which also operates in Angus. Hearing in both cases was set for March 19.

The present net monthly rates and the proposed monthly rates of the Angus-Tabor company are as follows:

Class of Service	*Present Net Rates*	*Proposed Net Rates*
Individual line, business	$1.25	$2.00
Rural multi-party, company owned .	1.25	1.75

In connection with the March 19 hearing on the alleged territory invasion, the commission stated that order of the hearing be served on the secretaries of the two companies.

Also, the Tabor Telephone Co. filed an application for an increase in its Angus rural multi-party rate from $10 to $15 per year. This case, too, was set for hearing on March 19.

V V

O. K.'s Lexington, Ky., Conversion; Dismisses Rate Request

The Kentucky Public Service Commission on March 1 authorized the Lexington (Ky.) Telephone Co. to acquire real estate and to construct a new building and to install rotary dial automatic switching equipment at its Lexington exchange and to make additions and improvements needed for the operation of dial service.

It further was ordered that the application of the Lexington company, requesting revised rates to become effective upon the commencement of dial service, approximately two years hence, be dismissed without prejudice to the rights of the company to seek an adjustment of its proposed rates when the conversion has been completed in accordance with the applicable laws of Kentucky.

Application for such authority was filed by the Lexington company on August 11, 1945, and stated that the company wanted "to acquire and install central office equipment and other facilities necessary to convert its existing manual system into a rotary dial automatic system, and upon completion thereof to increase its rates in accordance with a proposed monthly schedule set out in the application" as follows: Individual business, $8.00; two-party business, $6.50; eight-party rural, business, $5.00; individual line residence, $3.75; two-party residence, $3.00; four-party residence, $2.50, and eight-party rural residence, $3.00.

Hearings on the application were held on September 25, 1945, and on November 15, 1945, at which the city of Lexington and the OPA intervened, protesting the proposed rate increases. (TELEPHONY, October 6, 1945, page 20.) Briefs were submitted on behalf of the company and of the OPA in which no objection was made to the proposed conversion to dial, but only to the proposed increase in rates.

With its application, the company filed as an exhibit a comparative balance sheet as of June 30, 1945, and pro forma balance sheet as of the date immediately after conversion. The commission directed its staff to check this data both from an accounting and from an engineering standpoint and found the exhibit supporting the proposed rates satisfactory as a *current* balance sheet, but as conditions might change in the approximate two-year period before the dial system is placed in operation, and so that the company should be permitted to present to the commission revised exhibits showing the actual costs of the dial conversion and operating revenues and expenses, that part of the application dealing with rates was dismissed without prejudice to the rights of the company to seek an adjustment of its proposed rates upon conversion completion.

The commission stated, "The estimated costs incident to the proposed conversion and the estimates of operating revenues and expenses after conversion are probably as accurate as can be made at this time. . . . They constitute ample basis to support the proposed increase in rates set out in the application as amended. On the other hand, the commission recognizes that at this particular time it is difficult to estimate accurately the costs of building materials and of labor for the next two years. Moreover, estimates of the company's operating revenues and expenses for the period following conversion can be made with greater accuracy after conversion actually has taken place some two years hence. For that reason, this commission can consider the company's proposed increase in its rate schedule more intelligently after the actual costs of conversion are known, and when estimates of operating revenues and expenses can be based upon conditions then prevailing.

"It is urged by the company that if the commission grants the proposed increase in rates at this time, the company will be enabled to obtain monies necessary for the conversion at a better advantage; but the operation of the Kentucky law respecting public utility rates surrounds the prospective purchasers of the company's securities, its prospective creditors and other interested parties with the same degree of security and confidence as the approval of the proposed rates would afford.

(Please turn to page 42)

FOR SALE

SURPLUS GOVERNMENT-OWNED

USED—UNUSED

WIRE AND CABLE

TELEPHONE **TELEGRAPH**

EQUIPMENT

COSTING ORIGINALLY ABOUT

$2,500,000

CABLE—Aerial or underground, paper insulated, jute protected, 10-15-30-50-100-400 pairs, etc., submarine, single wire armor: WIRE—insulated, solid tinned copper inside, outside, color coded, twisted pair: TELEPHONE INSTRUMENTS—desk types, wall types, CB and dial, but less dial: MISCELLANEOUS—boards, test; spicers; binding post chambers.

Listings completely describing the material are now available at any RFC Regional Office. Ask for "WA Listing No. L-42, March 13, 1946," which contains detailed information about condition, location of items and how to obtain permission to inspect material at U. S. Signal Corps depot on and after March 20, 1946. This listing also contains an offer-to-purchase-form which must be used for the submission of all bids.

The equipment and parts are unpackaged (although some cable is on reels) but will be packaged after sale, when necessary, to insure safe shipment. All sales will be for cash unless credit terms have been arranged.

All bids must be delivered not later than 10 A. M. March 29, 1946, to the War Assets Corporation, 70 Pine Street, New York 5, N. Y., at which time bids will be publicly opened and read. The right is reserved to reject any or all bids.

VETERANS OF WORLD WAR II: To help you in purchasing surplus property from War Assets Corporation, a veterans' unit has been established in each of our Regional Offices.

For Further Information, Wire, Write, Telephone or Call at Address Above or at Any of the Regional Offices Below.

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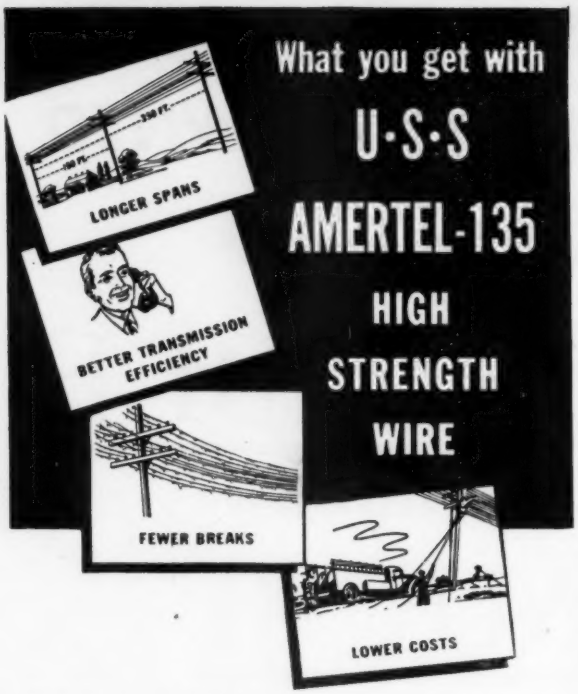

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Longer Spans. With 2½ times the tensile strength of standard "B.B." wire, Amertel-135 can be used in spans of 350 feet in heavy loading districts and 500 feet in light loading districts.

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Long Life. The superior "Hot" galvanizing process results in a coating that actually becomes alloyed with the steel itself. This assures longer life for Amertel products.

Fewer Breaks. Used with armor rods and special ties, Amertel has greater resistance to vibration and will stand up better in sleet storms.

Write for Technical Bulletin. Complete engineering and construction data are given in a special bulletin on U·S·S Amertel-135. Write for a copy today.

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By ARTHUR L. ALBERT

Professor of Communication Engineering, Oregon State College

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gives trouble-free performance in UNATTENDED locations

ONE, or at the most two, routine inspections a year are usually all that's required! . . . to replace water lost by evaporation.

That's because the Raytheon Recticharger carries the normal telephone current demand—so battery activity is cut to a minimum, and water loss is slight. And since there are no moving parts—virtually nothing to get out of order—repairs are rare indeed.

The Recticharger, with a small battery floated across its terminals, provides a dependable, constant-potential battery-charger and AC to DC power unit for a wide range of automatic communication systems.

It has many other operating advantages. Study them, in Bulletin DL48-263B, fully illustrated. Send for it today.

RAYTHEON

RAYTHEON MANUFACTURING COMPANY

Industrial Electronics Division, Waltham 54, Mass.

Excellence in Electronics

"The law requires this commission at all times to fix reasonable rates, and prospective creditors of the company reasonably may assume that the commission will do so at the proper time so that the company may determine a reasonable rate upon its legitimate investment so long as it renders adequate service to the public. If this commission should fail in that respect, the courts of Kentucky are open to the company for redress. It would seem that this assurance of the statutory law along with the duty of the commission and of the Kentucky courts, to enforce it, are all of the guaranty which a prospective creditor has a right to expect, or which with propriety can be granted at this time.

"Nor need there be any delay in making the new rate schedule effective after conversion. The company may file at that time such cost data and revised estimates as may be pertinent, and make the new rates effective immediately. Even if the commission suspended the new rates pending additional hearing for the entire 240 days permitted by law, the company could post bond guaranteeing refund of the excess collected during the period of suspension over the new rates as finally approved and make them effective at once as provided by the Kentucky revised statutes."

V V

Dial Telephones Approved For Lexington, S. C.

The South Carolina Public Service Commission has granted the Citizen's Telephone Co. permission to install a dial system in Lexington at an increased rate of $1.25 for business telephones and $1.00 for private lines.

Approximately 80 per cent of the company's subscribers agreed to the increase in telephone rates conditioned upon the installation of the dial system.

V V

Telegram Delivery by Radio-Equipped Trucks

The Western Union Telegraph Co. has received permission from the Federal Communications Commission to experiment with a new wrinkle in radio —delivery of telegrams by a radio-equipped truck which will print the message as it rolls toward its destination.

The FCC authorized the telegraph company to construct two experimental radio stations in the Baltimore area. A fixed station will receive telegrams and send them via radio to a "radio telegraph delivery unit," a mobile radio station mounted in truck or sedan.

Radio-telegraph delivery will speed service, Western Union declares, and it can be used to inform the central telegraph station that the addressee has moved or to transmit a reply to the telegram.

Western Union told the FCC: "The truck will be in motion to the next delivery point while transmitting or receiving messages, and in thus moving continuously throughout the area, the distance traveled and the delay to message delivery will be reduced."

Western Union plans to use both facsimile and teleprinter in its delivery experiments.

The Yellow Cab Co. of Philadelphia, Pa., also was authorized to construct experimental fixed and mobile radio stations to develop a radio communication taxicab dispatching system.

V V

Rate Increase Approved For Chapman, Neb., Company

The Chapman Telephone Co. has been authorized by the Nebraska State Railway Commission to increase rates on all classes of service at its Chapman and Archer exchanges from $1.25 to $1.75 per month. The new rates were effective March 1. The commission sustained the claim of the company that the present rates are not sufficient to provide the necessary revenues to operate and maintain the system and to make the repairs and improvements imperative to place and keep service in proper condition. The company showed that lines are badly deteriorated and that extensive repairs are needed.

The company has 190 stockholders who own a total of 442 shares of $15 stock. Magneto service is given 66 city and 114 rural subscribers at Chapman and 14 city and 63 rural subscribers at Archer. In 1945, the company had a total revenue of $4,976.66. Operating expenses and taxes left a return of $77.62. Under the new schedule, estimated income will be $6,262.56. Due to increases of operators' wages from $30 to $50 a month and other salaries, the estimated expense is $6,138.49, before taxes, and with taxes represents a loss of $432.06.

The annual report of the company showed a total fixed investment of $16,993, a depreciation reserve of $8,513 and cash of $2,842, with a net investment of $12,237. The commission fixed it at $9,813. The company had on file a rate for company owned instruments 25 cents a month in excess of that for subscriber owned instruments, but this was canceled by the commission on a showing that all now are owned by subscribers and that the company does not intend to furnish them in the future.

Rate Increase Will Allow Company to Improve Service

As a result of protests from businessmen and other subscribers to the Skeedee Telephone Co., operating at St. Edwards, Neb., the management has agreed to install common battery service and rebuild the properties on condition that rates will be increased.

A petition is to be circulated fixing rates at $3.50 a month for business; residence, $2.25, and farm lines $1.75, contingent upon the rehabilitation and improvement of the properties.

V V

Dial Service Planned For Blakely, Ga.

Mrs. Maude McCabe, manager of the Blakely (Ga.) Telephone Co., has announced that a new dial telephone system will be installed in Blakely within the next eight or 10 months.

New handsets will replace the present equipment. Estimated cost of installing the new equipment is $32,000, she said.

Mrs. McCabe has appeared before the Georgia Public Service Commission requesting its permission to install the dial system, as rates will have to be increased when the new system is installed.

V V

Directors Vote Sale of Wind Lake, Wis., Company

At the annual meeting of the Wind Lake Telephone Co., Norway, Wis., it was voted to sell the company to Hulbert Thompson, superintendent for many years, subject to the approval of the Public Service Commission of Wisconsin. If approved, reorganization will take place, it was reported.

V V

Asks for Purchase Approval

The United Telephone Co., Harrisburg, Pa., on February 15 filed application with the Pennsylvania Public Utility Commission for permission to buy the Wagner's Gap Rural Telephone Co.

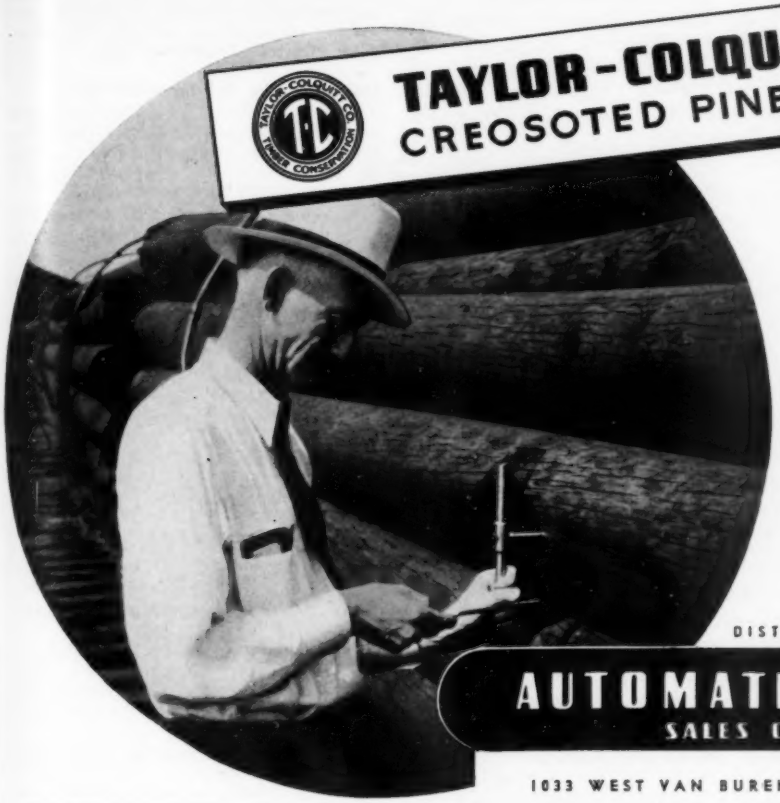
The application said the rural concern "has not been able financially to improve its facilities to render adequate service."

V V

Request Sale Permission

Mr. and Mrs. T. H. Woodcock, owners of the Maupin (Ore.) Telephone Exchange, recently applied to the Public Utilities Commissioner of Oregon for permission to sell that system and plant to Mr. and Mrs. Louis V. Woodside. The case was to be heard February 19.

TAYLOR-COLQUITT CO.
CREOSOTED PINE POLES



This Final Check Before They're Yours

To make absolutely certain that the poles have received full creosote penetration, this man takes increment borings of each charge as it is withdrawn from the treating cylinder.

This is the last of many inspections made by Taylor-Colquitt to guarantee you of perfectly impregnated, sound, long-lived poles. And long life means lower cost per year of service.

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Additional information on Tungar bulbs and other Tungar battery charging equipment may be had by writing to Section A-3613-4, Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn.

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Electrox Battery Chargers are designed and made for telephone men by telephone men, who know the special needs of the telephone industry.

Every Electrox is therefore really a "custom-built" job, with all the extra quality, the extra "know-how" in construction and assembly, the extra care in inspection and final testing that goes into a special product.

That is why you get extra capacity, extra service, extra long life—more for your money! —in Electrox Battery Chargers.

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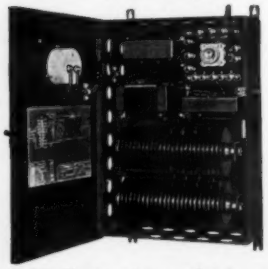


Type RB Electrox is completely automatic; keeps batteries in peak condition at all times. Capacities of 1 to 12 amperes, from 24 to 48 volts. Other capacities available to meet individual requirements.

Write for Cir. 443
Order from your Jobber.

ELECTROX DIVISION SCHAUER MACHINE CO.
2057 Reading Rd. - Cincinnati 2, Ohio

ICC Approves Rate Boost

The Illinois Commerce Commission announced February 14 it has approved increased telephone rates in Mount Pulaski, Chestnut and Latham by the Mount Pulaski (Ill.) Telephone & Electric Co.

V V

Plans Independent Purchase

News and Views, publication of the Oregon Independent Telephone Association, recently stated that Harry R. Floyd is to purchase the Smock Telephone Co., Holland.

V V

Approves Independent Sale

Sale of the Robbinsville (N. C.) Telephone Co. by James Penland to Frank T. Hamilton of Robbinsville for $4,000 recently was approved by the North Carolina Utilities Commission.

V V

Summary of Commission Rulings and Hearings

Federal Communications Commission

February 26: Granted American Telephone & Telegraph Co., Long Lines Department, Ocean Gate, N. J., modification of license to add frequency and delete reference to two special provisions relating to transmitting equipment.

February 26: Granted American Telephone & Telegraph Co., Long Lines Department, Lawrenceville, N. J., modification of license to add frequency 4097.5 kilocycles.

February 27: Granted American Telephone & Telegraph Co., Long Lines Department, Dixon, Calif., modification and extension of special temporary authority, using its regularly licensed equipment, frequencies, power and emission to communicate with the Philippine Long Distance Telephone Co. at Manila, P. I., for the rendition of public radio-telephone service; conditions; authority to continue from February 28 until further order of the commission, but not beyond December 1.

March 1: Granted special permission to American Telephone & Telegraph Co. to amend its tariff, effective on not less than one day's notice, to reduce rates for overseas message toll telephone service between certain states in the U.S. and the U.S.S.R.

March 4: Granted American Telephone & Telegraph Co., Long Lines Department, Lawrenceville, N. J., and Ocean Gate, N. J., extension of special temporary authority to point to point radio-telephone stations in the fixed public service, using their regularly licensed equipment, frequencies, power and emission to communicate with a station operated by the AT&T company at Frankfurt, Germany, conditionally. Authority to continue from March 5 until further order of the commission, but not beyond December 1.

California Railroad Commission

March 1: Application filed by W. Gilman Snyder, requesting authority to increase rates at Weaverville and vicinity served by Western Telephone Co.

March 1: Application filed by O. H. and W. E. Ivey, requesting authority for five-cent charge for local calls from public pay-stations served by Mariposa (Calif.) Telephone Co.

Indiana Public Service Commission

February 19: Hearing on the joint petition of Owensville (Ind.) Telephone Co. and Princeton (Ind.) Telephone Co. to sell and buy, respectively, telephone property in Owensville.

March 1: Application filed by Frank L. and Maude Beams for authority to sell Spencerville (Ind.) Telephone Co. to Wm. M. and Ethelyn E. Miller.

March 1: Application filed by Pleasantville (Ind.) Incorporated Telephone Co. asking authority to serve territory formerly served by Pleasantville (Ind.) Cooperative Telephone Co.

March 1: Application filed by Whitesville (Ind.) Cooperative Telephone Co. to increase rates.

March 1: Petition filed by Frank F. Pierce et al asking that service rendered by Millville (Ind.) Telephone Co. be improved.

Kansas State Corporation Commission

March 11: Hearing on application of Farmers Mutual Telephone Co., Wellington, for permission to cease operating.

March 25: Hearing on application of Esbon (Kan.) Telephone Co. and Peoples Telephone Co., Lebanon, for permission to cease operating free service lines there.

March 25: Hearing on application of Webber (Kan.) Mutual Telephone Co. for authority to make certain rate changes.

March 25: Hearing on application of Chas. E. Reece, doing business as Riley (Kan.) Rural Telephone Co., for permission to transfer franchise and cease operating.

April 1: Hearing on application of Tipton (Kan.) Telephone Co. for authority to make certain rate changes.

New York Public Service Commission

March 13: Hearing on joint application of Stedman (N. Y.) Telephone Co. and Jamestown (N. Y.) Telephone Corp. for consent to sale and purchase, respectively, of Stedman property.

Oklahoma Corporation Commission

March 20: Hearing on application of Ray Furnish et al for declaration of Putnam and surrounding area as open territory.

March 20: Hearing on applications of subscribers of Southwest States Telephone Co. for better service at Jenks and Moore.

March 27: Hearing on application of Sharon (Okla.) Telephone Co. for rate increases.

April 1: Hearing continued on application of Fred Barrett to require Oklahoma Automatic Telephone Co. to restore and improve service at Clarita.

Utah Public Service Commission

May 13: Hearing on intrastate toll rates of Mountain States Telephone & Telegraph Co.

Wisconsin Public Service Commission

March 14: Hearing on application of Commonwealth Telephone Co. for authority to install dial service and increase rates at its Lone Rock exchange.

Another Western Utility Chooses FOUR-WHEEL-DRIVE FOR MULTI-PURPOSE DUTY

One of a fleet of 35 FWDs now serving The Pacific Gas & Electric Co., San Francisco, California

Service in the western mountain region is tough on utility trucks . . . but FWDs continue to prove that no utility service is too tough for these rugged Four-Wheel-Drive Trucks.

The FWD Model "HA" Line Construction and Maintenance Truck shown above recently entered the service of the California Water and Telephone Co., Telephone Division, Los Angeles. Equipped with an FWD Utility V-10 Line body, single drum winch and LM type pole derrick, this Four-Wheel-Drive Truck is ready for the most difficult duty . . . and can be depended upon to "make good".

It will get crews and equipment to location, on or off the highways, through sand, mud, or over rugged mountain terrain . . . because the FWD principle puts more power and traction on all four wheels, is safer on slippery roads and dangerous curves, and faster up-hill or down (with safety). Rugged construction and balanced weight distribution on all four wheels provide economy in oil, gas, tires and replacements. The fact that more than 200 utilities now use FWDs, proves the value of these trucks for line construction and maintenance work.

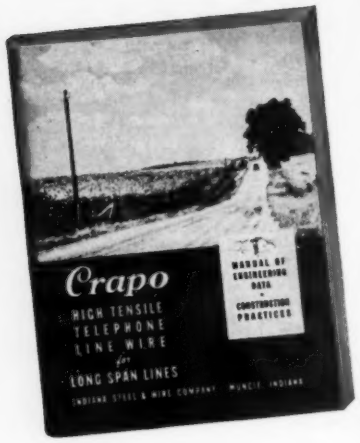
AVAILABLE NOW . . . *See your nearest authorized FWD dealer . . . or phone, wire or write.*

FWD TRUCKS

THE ORIGINAL EXCLUSIVE BUILDERS OF FOUR-WHEEL-DRIVE TRUCKS

THE FOUR WHEEL DRIVE AUTO CO.,
Clintonville, Wisconsin
Canadian Factory: **KITCHENER, ONTARIO**

Meet Rural Demands with Longer Spans!

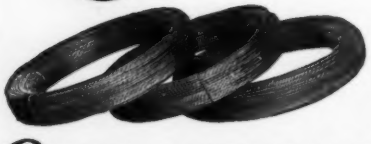


Ask for Copy of This New Manual!

Long-span construction, made possible by *Crapo* HTL-135 and *Crapo* HTL-85 High-Tensile Telephone Line Wire, holds the key to the economical expansion of rural telephone service. Construction costs are materially reduced because 10 to 15 fewer pole structures per mile are required. Maintenance expense is less because of the fewer structures and because the superior strength of these wires provides an increased factor of safety.

If you contemplate extending or re-building your outside rural plant, be sure to get a copy of our new Manual of Engineering Data and Construction Practices! It is filled with factual information which will aid you in your planning. Ask your distributor of *Crapo* Galvanized Wire and Strand or write for Manual No. 203.

Indiana Steel & Wire Company
Muncie
Indiana



Crapo HIGH-TENSILE
TELEPHONE LINE WIRE

NRECA Urges Bell to Double Proposed Rural Expenditures

During its fourth annual meeting in Buffalo, N. Y., the National Rural Electric Cooperative Association on March 7 adopted the following resolution urging the Bell System to double its proposed expenditure of $100,000,000 for rural telephone expansion during the next five years and urged Independent telephone companies to set aside relatively favorable sums so that rural areas will have adequate telephone service in the future.

"Whereas your telephone committee has met with authorized representatives of the Bell Telephone System who outlined their expansion program of rural telephone service and committed their companies to an expenditure of $100,000,000 over a five-year period, enabling them to bring rural telephone service to 1,000,000 farm families not now receiving service.

"And whereas your committee, through this convention, requests the Bell Telephone System to appropriate a total of $200,000,000 for the said five-year period, thereby assuring an additional 1,000,000 farm families of telephone service in excess of their present commitments.

"And whereas your committee, through this convention, wishes to notify all other telephone systems and to request them to proportionately plan adequate rural telephone service in the areas served by them.

"Whereas your committee recommended to the members of the National association that all assistance possible be given to all operating telephone systems to the end that adequate rural telephone service will be extended to all areas not now served at the earliest possible time.

"Therefore, be it resolved that the foregoing recommendations be referred to the board of directors for their direction.

"Be it further resolved that the board of directors is requested to keep in close touch with rural telephone expansion and to authorize the executive committee to appoint two men in each region to work with the telephone systems in that region, for the full expansion of adequate rural telephone service, and we further recognize the determination on the part of our people to have rural telephone service one way or the other."

V V

Bartelink Named Radio Engineer by General Telephone

It recently was announced by Harold V. Bozell, president of General Telephone Co., New York City, that E. H. B. Bartelink has joined the General Telephone system with the title of radio engineer. His headquarters will be at the company's offices in New York City.

Plans for the use of radio in connection with telephone service for communication with moving vehicles, isolated rural establishments and for certain toll purposes have advanced very rapidly, and Mr. Bartelink will act as advisor to all of the companies in the General system, some of which already have plans actively under way in connection with experimenting and eventually rendering service in these fields, Mr. Bozell stated.

Mr. Bartelink is a native of Holland, a graduate of the "high school" at The Hague and holds degrees of master of science in electrical engineering from Delft University and doctor of philosophy from Munich University.

For nearly seven years he was with the telephone system in the Netherlands, during which time he organized the long lines transmission laboratory and performed research work on high speed telegraph transmission on telephone lines and on telephone privacy equipment and had extensive experience in the operation of the system. He later was in charge of the technical equipment of the Amsterdam toll office, which includes the terminal equipment for the radio link with the Netherlands East Indies and the toll lines to other European countries.

He came to the United States early in 1937 and was with the research laboratory of the General Electric Co. in various investigations having to do with radio and electronic developments, including research in multiple pulsed radio transmission, combining picture and sound transmission on the same carrier, etc., and subsequently was in charge of a group doing system research in radar and various other matters of a wartime nature.

From August, 1934, until he left to join the General Telephone system he was working for the government in its radiation laboratory at the Massachusetts Institute of Technology. He holds some Netherlands patents and has about 25 pending applications in this country.

V V

Commerce Post for B. I. Noble

B. I. NOBLE, recently named assistant to the general manager of the Lincoln (Neb.) Telephone & Telegraph Co. (TELEPHONY, February 23, page 39.), has been appointed vice chairman of the industrial committee of the Lincoln Chamber of Commerce. The committee will promote the location in the city of additional branches of national industrial companies. Mr. Noble recently returned from an extended term of military service.

General Corporation to Acquire Ohio and Kentucky Properties

The General Telephone Corp., New York, N. Y., will acquire all the assets of the Associated Public Utilities Corp., Columbus, Ohio, under an agreement which has been entered into by these companies, according to a joint announcement made March 12 by Harold V. Bozell, president of the General Telephone Corp., and Richard A. Lumpkin, president of Associated Public Utilities Corp.

This agreement, which constitutes a "plan of reorganization" for Associated Public Utilities, is subject to approval of the stockholders of that corporation. The agreement calls for the delivery by General corporation of 47,142-6/7 shares of its common stock to the Associated corporation in exchange for the latter's assets. Also, it provides for liquidation of the Associated Public Utilities Corp. and the distribution pro rata to its stockholders of the shares of common stock of General Telephone Corp. so acquired.

Upon liquidation, Associated Public Utilities' stockholders will receive one share of General Telephone Corp. common stock for each 1¾ shares of Associated common stock held at date of distribution.

The Associated corporation owns all the outstanding stocks of two telephone companies: Ohio Standard Telephone Co., Columbus, and Ashland (Ky.) Home Telephone Co. It also owns the stock of three water properties; one in Jackson, Ohio, one in Frankfort, Ind., and one in Seymour, Ind. The property of the Ohio Standard company, serving about 25,000 telephones through 71 exchanges in Ohio, well can be integrated with those of the General corporation's subsidiary, Ohio Associated Telephone Co., which now serves about 31,000 telephones.

Likewise, the operations of the Ashland company's properties, serving about 15,000 telephones through its Ashland, Ky., exchange and 16 other exchanges in Kentucky, well can be integrated with those of General's Kentucky subsidiary, Lexington (Ky.) Telephone Co., which now serves about 22,000 telephones.

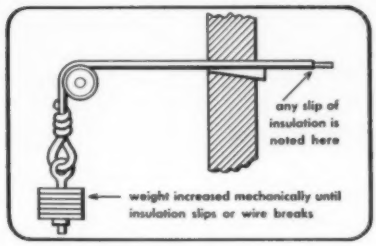
The Associated Public Utilities Corp. has called a meeting of its stockholders to be held April 10, at which formal stockholders' approval will be sought. The date anticipated for actual consummation of the plan is May 16.

V V

» The first telephone in the White House at Washington was installed in 1880, during the presidency of Rutherford B. Hayes.

TELEPRENE
DROPWIRE

ADHESION TEST



Specimen is wedged into solid body similar to method of fastening in field, then submitted to pull.

If adhesion is less than tensile strength of wire, the insulation will slip on wire.

This test proves conclusively that TELEPRENE will not slip in the supporting clamp due to the lack of Adhesion between Conductor and Insulation.

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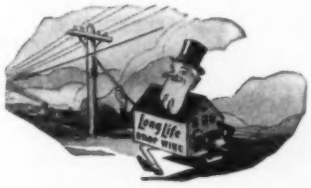

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AT&T Annual Report

(Concluded from page 28)

tered the armed forces, of whom 61,500 were men and 6,200 were women. By the end of 1945, 26,500 had applied for reinstatement in the Bell System and have been placed suitably. Current experience indicates that 94 out of each 100 Bell System employes who entered the armed forces are returning to their companies.

Western Electric Co.

Reconversion from heavy war production to high-rate peacetime manufacture by the Western Electric Co. was well advanced in 1945.

In four years—1942 through 1945—the company supplied to the government more than $2,000,000,000 worth of communication, electronic and other specialized equipment. Radars of 70 types supplied by Western Electric Co. represented in dollar volume half of all radar bought by the government.

Western Electric's sales to the government for the year 1945 amounted to $650,429,000, or 76 per cent of its total sales, compared with $788,860,000, or 85 per cent in the previous year. Government sales for 1945 included $133,258,000 in claims against contracts terminated.

Total sales of Western Electric Co., including subsidiaries, amounted to $860,713,000, compared with $926,851,000 in 1944. Sales to the Bell telephone companies amounted to $188,916,000, or 22 per cent.

Earnings of Western Electric Co., including subsidiaries, amounted to $15,126,000 in 1945, or less than 2 per cent on total sales, compared with $13,858,000 for the preceding year. Earnings resulting from government business are subject to renegotiation. Renegotiation proceedings for the year 1945 have commenced and the company believes that adequate provision has been made for any adjustment which may arise therefrom. Renegotiation proceedings for the years 1943 and 1944 were concluded in 1945. While refunds were made to the government which had a net effect, after taxes, of $1,275,000 for 1943 and $1,154,00 for 1944, adequate provision therefor had been made in the accounts for those years.

Benefit and Pension Plan

The pension trust funds of the Bell System companies, including the Western Electric Co. and the Bell Telephone Laboratories, amounted to $604,209,000 at the end of 1945. Pension accruals added to the trust funds during the year amounted to approximately $72,247,000, or 6.1 per cent of the payroll. Certain of the companies made payments into their trust funds in 1945 in addition to their pension accruals, such payments amounting to $12,295,156. Pension disbursements from the trust funds during the year were $12,993,000. At the end of the year there were 9,756 men and 5,430 women, or a total of 15,186, on the service pension payrolls.

Other payments made under the benefit plan to about 90,000 employes and dependents of employes in 1945 totaled $21,483,000.

V V

Leonard M. Baker Dies in Arizona

LEONARD M. BAKER, age 53, a prominent figure in the telephone industry of Oklahoma, died at Phoenix, Ariz., February 27. His death followed four years of illness, which developed as the result of a stroke while he was district manager of the Southwestern States Telephone Co., Purcell, Okla.

After partial recovery he was employed for a time in the headquarters office of the Southwestern States company at Brownwood, Tex. and then returned temporarily to Oklahoma and located at Frederick. Upon a recurrence of his illness he and Mrs. Baker moved to Phoenix.

Son of W. H. Baker, an Oklahoma telephone pioneer, Mr. Baker learned the business under his father who, in the early days, was manager for the old Topeka & El Reno Telephone Co. at Weatherford, Okla., and later was manager at El Reno, Okla., after the Southwestern Bell Telephone Co. had taken over both properties.

From 1908 to 1915, Mr. Baker was employed in the plant department of the Southwestern Bell Telephone Co. at various points in Oklahoma. He then went to Colorado where for a few years he was employed at Salida by the Mountain States Telephone & Telegraph Co.

Returning to Oklahoma, he was employed by the Southwestern States Telephone Co. at Frederick, Okla., advanced to district manager there and later was appointed district manager at Purcell.

For several years, up to the time of his illness, Mr. Baker was a director of the Oklahoma Telephone Association and was very active in that organization. He is survived by his widow and two sons.

Rural Line Service

(Concluded from page 18)

while working on other sections.

(3) Installing acoustic shock reducers, if not already installed in operators' and testboard telephone circuits.

(4) Provide rubber gloves, blankets and hose to protect linemen while working on the exposed open wire circuits or cable.

(5) Install shield wires or cables throughout the exposures.

(6) Installation of neutralizing or isolating transformers or drainage coils.

Service Improvement

It is the intent of this discussion to point out, in a non-technical manner, some of the underlying causes of power line induction in telephone circuits in general, with special reference to exchange (including rural) circuits; also, the detrimental effects of induction on telephone service, the limiting values of noise in and impressed voltages on telephone circuits and the remedial measures which have been employed satisfactorily in the past.

The advance planning and coordination of construction between power and telephone companies is and will continue to be the outstanding factor in avoiding the detrimental effects of proposed power exposures and in mitigating those effects where exposures are unavoidable. These methods are equally applicable to construction by the Rural Electrification Administration as well as private commercial power companies.

The application of remedial measures to existing exposures, where such measures have not been applied and where noise and low frequency hazards are not satisfactory should, in the interest of furnishing good telephone service, be considered by the telephone companies involved. Continuous attention to these conditions eventually will result in a better grade of telephone service throughout the country.

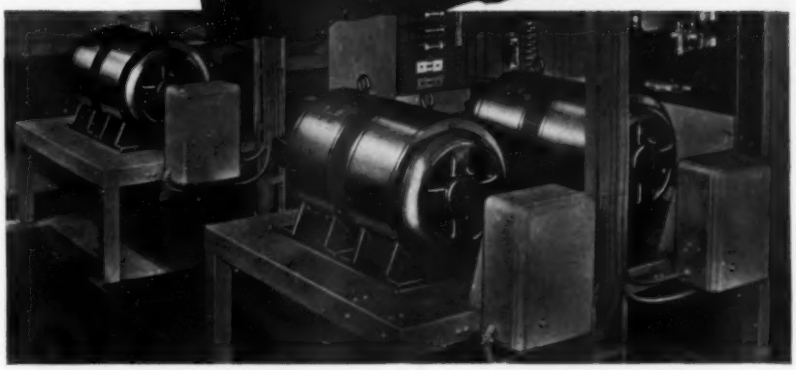
(To Be Continued)

V V

OBITUARY

ANNA YORK, a director of the Crawford Telephone & Telegraph Co., Girard, Kan., for the past 23 years and wife of C. J. York, secretary treasurer of that company, died February 12 at Tucson, Ariz.

Users say "DIVERTER-POLE CHARGERS ARE *Quiet*"



Long-time users* of E.P. Diverter-Pole Motor-Generators were asked, "What is your opinion of the Diverter-Pole Motor-Generator as regards Mechanical Noise and Electrical Noise?"

..Here are some of the answers:

USER	MECHANICAL NOISE	ELECTRICAL NOISE	DIVERTER-POLE INSTALLED
A	"QUIET"	"NONE"	1932
B	"QUIET"	"NONE"	1931
C	"QUIET"	"NOT NOTICEABLE"	1929
D	"QUIET"	"PRACTICALLY NONE"	1928
E	"QUIET"	"SOME"	1926
F	"MODERATELY QUIET"	"NONE"	1926
G	"MODERATELY QUIET"	"SOME"	1925

X-14

For the most reliable, maintenance-free and efficient source of direct current, specify E.P. Diverter-Pole Motor-Generators. *WRITE FOR BULLETIN 96-A*

*Names on request

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Makes Cable Work Fast and Safe

Cable Reel Jack No. 322, with right and left-hand bases; used in pairs. Handles reels up to 7' in diameter and 20 tons in weight. The broad "T" base affords a firm, non-rocking foundation. Other screw and lever types, 5 to 15 tons capacity.

Simplex Cable Reel Jacks have made paying out cable a speedy operation through the ease with which heavy reels are safely lifted, saving their cost many times over. Ask for Bulletin U42.

Simplex
LEVER SCREW HYDRAULIC
Jacks

Templeton, Kenly & Co.
Chicago (44), Illinois
Better, Safer Jacks Since 1899

W. T. Lawrence Returns To Automatic Electric

After 45 months in army service in the tropics, Lieut. Col. Walter T. Lawrence, former staff representative for Automatic Electric Sales Corp. in the eastern district, returned to the company on March 1, in the capacity of staff engineer, according to an announcement by H. F. Lello, vice president and general manager. He will have his headquarters at the company's home office in Chicago.

W. T. LAWRENCE

Colonel Lawrence served more than 3½ years in the Caribbean area, having first been assigned by the chief signal officer in February, 1942, to take charge of the wire section at the Trinidad Sector and Base Command, Signal Office. There he was responsible for the engineering and installation of all fixed inside and outside plant facilities throughout the sector, including British and Dutch Guiana, Trinidad, Aruba, Curacao, St. Lucia and other localities.

As these projects developed, Colonel Lawrence was advanced to post signal officer at Fort Read, the largest army establishment in the area, with supervision over a 2,000-line modern automatic telephone exchange, including more than 50 route miles of cable.

Prior to entering the service as a reserve officer, Colonel Lawrence had been associated with Automatic Electric Co. and its sales and service affiliates since 1925. In that year, he graduated from Iowa State College with a degree in electrical engineering. He first served in the installation and operating departments in the eastern states, and then in Chicago as liaison representative in the engineering and sale of private automatic exchange equipment. Later, he became engineer in the eastern district with headquarters in the company's New York office. From 1939 to February, 1942, he served as staff representative on army, navy and other government negotiations in the eastern district.

Previous telephone experience included work during summer vacations from college for the Northern States Power Co., Sioux Falls, S. D.; the Dakota Central Telephone Co., Aberdeen, S. D., and the Sioux City Telephone Co., Sioux City, Iowa.

Colonel Lawrence is a member of the American Institute of Electrical Engineers and is licensed as a professional engineer in the state of New York.

V V

Hallicrafters Advance N. P. Case To Chief Engineer

The Hallicrafters Co., Chicago, Ill., producers of high frequency radio equipment, has announced the promotion of Nelson P. Case, formerly chief engineer of the firm's receiver division, to chief engineer for the entire Hallicrafters organization.

In making the announcement, William J. Halligan, Hallicrafters president, discussed Mr. Case's wide knowledge and experience in the electronics field, as evidenced by the 30 patents he holds on radio circuits.

New Improved THIMBLEYE TWINEYE • TRIPLEYE Anchor Rods and Guy Fixtures

You will instantly recognize the change in Thimbleye, Twineye, and Tripleye anchor rods and guy fixtures as being a definite improvement in appearance and an added protection to the guy strands. The streamlined appearance is the result of improvements designed to give more complete protection to the strand at varied angles of pull, the objective being to further minimize any hazards to line security caused by kinked, distorted, or broken strands of cable.

The improved eye is drop forged on the rod as a perfectly shaped thimble and the sidewalls and groove of the eye extend all the way around the head of the rod. This keeps the strand from flattening under tension, preserves its natural roundness, and prevents it from kinking at any one point. All grooves conform, in depth and width, to the largest cable size used with each rod or guy fixture. Grooves are deeper and give better support to the guy strand.

Always specify Thimbleye, Twineye, or Tripleye rods and fixtures. Your nearest jobber can supply you.

C463A

ABC INDUSTRIES

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Webster Electric Appoints New Advertising Manager

Webster Electric Co., Racine, Wis., manufacturers of Teletalk intercommunication systems, has announced the appointment of K. J. Norman as advertising manager.

Mr. Norman will be in charge of a complete advertising program on the Webster Electric line of inter-communication and sound systems, fuel units and transformers for the oil burner industry and the new thermo-drive control for heating and air conditioning systems.

K. J. NORMAN

Recently released from service with the army transportation corps, where he served as a captain, Mr. Norman was associated with the advertising department of the Burroughs Adding Machine Co., Detroit, Mich., before entering service. He is a graduate of the University of Michigan.

V V

Federal Appoints A. C. Urffer Industrial Relations Director

The Federal Telephone & Radio Corp., New York, N. Y., domestic manufacturing affiliate of the International Telephone & Telegraph Corp., has announced the appointment of A. C. Urffer as director of industrial relations. Mr. Urffer joined the Federal corporation in 1944 after extensive experience in various phases of industrial management. He previously had been associated with the management consulting firm of Stevenson, Jordan & Harrison, New York, N. Y., and before that was an engineer with the General Electric Co.

Mr. Urffer is a graduate of Bucknell University, from which he received a bachelor of science degree in electrical engineering in 1928, and of the University of Newark which awarded him a law degree in 1936.

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"DEPENDABLE" CROSS-ARMS

MADE BY:
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The best quality cross-arms you can buy.

AVAILABLE IN:
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For sturdy, well-seasoned cross-arms, specify "DEPENDABLE"

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CONSTANT VOLTAGE BATTERY ELIMINATOR

Type RA

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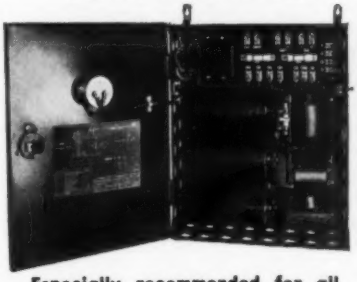

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Completely Automatic Requires No Manual Adjustments

Delivers smooth, humless, constant output voltage irrespective of current drain, up to the maximum output of the rectifier. Standard rectifier capacities of 1 to 4 amps., from 12 to 48 volts.

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Write for Circular 443

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New Equipment Scheduled For Jerseyville, Ill., Company

J. T. Schwarz, manager of the Jerseyville (Ill.) Telephone Co., has announced that the company has contracted with Kellogg Switchboard & Supply Co., Chicago, for new central office equipment.

The new installation, which is expected to be ready for operation by July, will consist of a five-position manual, masterbuilt, common battery switchboard of 1,600 lines capacity. It will replace obsolete equipment which has been in use for many years.

The Kellogg company also announces completion of five new relaymatic installations in Illinois, Arkansas, Missouri and Florida.

Three of the new installations of 100 lines capacity were completed at Brownstown, Ill., Holcomb, Mo., and Pottsville, Ark.

Relaymatic boards of 50 lines capacity have been installed in Elmira, Ill., and Wewahitchaka, Fla.

V V

S. V. Dillon Advanced By Johns-Manville

S. V. Dillon of New York, N. Y., has been named staff manager, electrical section, Johns-Manville Sales Corp., J. A. O'Brien, vice president, recently announced.

Mr. Dillon has been associated with Johns-Manville since 1920, serving as an electrical specialist in the sales engineering department and as assistant manager, public utility and electrical department until his present promotion.

Ayers Joins Copperweld Sales Engineering Staff

D. Paul Ayers, formerly division engineer of the Kansas Power & Light Co. at Topeka, Kan., has joined the sales engineering staff of Copperweld Steel Co., Glassport, Pa.

D. P. AYERS

A graduate of Kansas State College, Mr. Ayers has a background of 18 years' practical experience in the design, construction, operation and maintenance of electrical transmission and distribution systems.

V V

New Biddle Bulletin Describes "Megger" Instruments

An attractive four-page bulletin just issued by James G. Biddle Co., Philadelphia, Pa., describes three different types of "Megger" instruments for measuring low resistance.

These include the "Bridge-Meg" resistance tester—a combination Wheatstone bridge and "Megger" insulation tester; the "Ducter" low resistance ohmmeter, which operates by pointer deflection down to .000001 ohm, and the midget "Megger" circuit testing ohmmeter, which reads from a fraction of an ohm up to 200,000 ohms.

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MICHIGAN POLE & TIE CO.
NEWBERRY—GRAND RAPIDS
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B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

C. M. Christiansen Co., Phelps, Wis.—Northern White Cedar Poles, plain or butt treated.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

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